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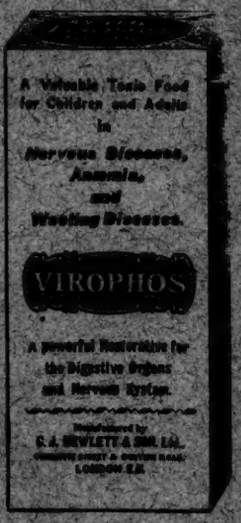
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THE DEVELOPMENT OF BRITISH SURGERY IN THE HOSPITALS ON THE LINES OF COMMUNICATION IN FRANCE.

BY

SURGEON-GENERAL SIR GEORGE H. MAKINS, K.C.M.G., C.B., F.R.C.S.,

CONSULTING SURGEON, BRITISH ARMIES IN FRANCE.

THE general hospitals on the lines of communication in France have undergone a steady process of extension in accommodation and development since August, 1914. They have been housed very variously—some in the original tent units, some in huts, and some in large buildings adapted to their present purpose. Tented units under the climatic conditions of France have proved to possess but one virtue, that of mobility, and in all the tented hospitals still remaining a certain proportion of huts for serious cases, operating theatres, mess accommodation and stores and offices, have been added. The most satisfactory units are hutted throughout, and these leave little to be desired either for comfort or for satisfactory work, even when compared with the civil hospitals at home. Most of the buildings now in use are either of the nature of public buildings or of large hotels. Each possesses some special advantages. The large rooms of casinos, etc., form excellent wards, easily overlooked and economical to work, but such buildings need usually considerable reinforcement with regard to sanitary accommodation. The hotels are more convenient for officers as providing a large number of smaller rooms, but this necessitates a somewhat larger nursing staff, and renders attention to individual patients a more troublesome task.

FIG. 1.—Interior of a ward at a general hospital at a base in France.

Special hospitals are set apart for the treatment of infectious cases, for skin diseases, and for venereal cases.

All the Dominions are represented. Thus Canada, Australia, New Zealand, and South Africa have all provided general or stationary hospitals in addition to the more mobile units present in the advanced lines. There is also an American voluntary unit.

Each unit is complete in itself, possessing operating theatres, clinical laboratory, and its own disinfecting apparatus. The only department that is commonly massed when a number of units are collected in the same area is the mortuary and accommodation for *post-mortem* examinations. The majority of the units—the normal capacity of which is 520 beds—have been extended by the provision of additional ward accommodation to receive 1,040 patients, while in times of stress a further extension to 2,000 is possible by the addition of tents. The number of patients which may need to be dealt with during active fighting may be very large; thus during the first three months of the action on the Somme as many as 8,500 wounded men have been passed through a single unit. This necessitates ample operating theatre accommodation, and in all either a large theatre is provided, or in one type of unit two, so that at least four operating tables can be kept at work contemporaneously. In spite of these provisions, at busy times the surgeons may be engaged continuously in shifts for two or three days and nights without cessation.

Within certain limits, arrangements exist for the aggregation of special classes of injury, such as fractures of the bones of the limbs, injuries to the face and jaws, compound and complicated fractures of the skull and vertebral column, and wounds of the chest.

In connexion with each large hospital camp convalescent camps are established, and life in these is rendered more pleasant to the men by the provision of the social huts of the Young Men's Christian Association, the Church Army, and other bodies.

HOSPITAL TRAINS AND MOTOR AMBULANCES.

The vast majority of the patients admitted to the general hospitals are brought down by the hospital trains. Although even the best of the present trains can only be said to be a slight advance on some of those in use during the South African campaign, or those already provided for transporting the patients on their arrival in port in England at the commencement of this war, yet the development of the hospital train in France was a matter of extreme urgency and great difficulty in the initial stages of this campaign. It seems as if both France and Germany had relied for the railway transport of the wounded on the same means which served the purpose in the war of 1870–71. In fact, with the exception of the addition of frames for carrying stretchers placed on the floors of merchandise wagons, no special arrangements appear to have been made. The trains conveying the wounded from the front were provided with no permanent arrangements for cooking food, no sanitary conveniences, no provision for the carriage of water, and, in fact, consisted of a mere string of trucks, with no means of intercommunication to allow the attendants to pass readily from wagon to wagon. To add to the miseries of the journeys made in these trains, they were long, sometimes extending over two or three days before the west coast was reached.

A small difference in gauge in the French and English lines prevented the prompt shifting of English hospital carriages across the Channel, and too great praise cannot be accorded to the officers who set to work to improvise more satisfactory means of railway transport. Odd carriages of every build and description were obtained whenever opportunity offered, and within a few weeks with alterations hastily but effectively carried out, a number of efficient if not luxuriously appointed hospital trains were forthcoming, and it says much for the officers who did this work that although at the present time over thirty hospital trains are running, no less than seven are of the original improvised series, and are still found efficient.

One word should be added regarding the fleet of improvised barges which run on the canals between the front and two of the general hospital areas. There is no doubt that the smooth passage of these boats provides the acme of comfort for patients to whom the unavoidable shaking of a railway journey entails both pain and harm. It is unfortunate that the general utility of the barges is limited to the few districts in which canals are to be found.

The splendid motor ambulance convoys attached to each district, and for most of which the army is indebted to the Red Cross Societies of the United Kingdom and the Colonies, have been already referred to as to their work at the front, and no further mention of their devoted work is necessary at this place.

As to the last link between the general hospitals on the lines of communication and the base in England, the hospital ships, it suffices to say that they leave nothing to be desired.

WOUND TREATMENT.

This question, which has exercised the ingenuity of man since the birth of surgery, has abated no jot of its capacity for arousing controversy and avoiding a solution which can satisfy all.

Experience has in no way controverted that gained in civil practice in the use of aseptic methods, but has, on the other hand, proved conclusively that advance in the treatment of septic wounds has had in this campaign to start from an unfamiliar standpoint, and has progressed but slowly. Practical application has demonstrated the superiority of the Listerian principle and method, but the multiplicity of the chemical media employed affords evidence enough of the difficulty met with in establishing any one means as that suitable for every class of case. On two points alone can no difference of opinion exist: (1) The urgency of an efficient primary mechanical cleansing and exposure of the wound cavity, and (2) the importance of maintaining the wounded part at rest. The latter point raises the first great difficulty which has to be met by the military surgeon, the absolute necessity of early transport of the wounded man; and leads directly to a second, the amount of interference advisable in wounds which have reached the "intermediate stage," that is, the period of established infection during its first phase, the condition, in fact, in which a large proportion of all gunshot wounds reach the general hospitals on the lines of communication.

Speaking generally, it has been shown that if the primary mechanical cleansing of the wound has been thoroughly carried out, no further gross intervention should be necessary; further, that if want of time and medical officers has not allowed of this procedure being fully carried out, yet if the wound has been sufficiently opened up and primary drainage ensured, the subsequent treatment is comparatively simple. From the point of view of the surgeon on the lines of communication, free incisions are never objectionable, provided they be made in such directions as not to render the subsequent secondary closure of the wound impracticable, the one structure for which he pleads avariciously being the integument. The primary cleansing, given satisfactory surroundings, cannot have been undertaken too early, as every hour of delay adds to the subsequent task of dealing with the infection. In this relation the immediate removal of shell fragments and clothing is of the first importance, because if allowed to remain the deferred operation, even in minor wounds, may prove a procedure of great danger when the patient has arrived at the general hospital on the lines of communication. Such an apparently trivial operation may be followed at this stage by an acute extension of anaërobic infection involving the whole segment of a limb, the entire member, or indeed be sufficiently extensive to lead to the loss of the limb, or even the patient's life.

The conditions of war, however, not infrequently prevent an ideal early treatment of the wounds. It may be impossible to remove patients from "No Man's Land," or even from the trenches, for many hours or even days after reception of the wound. On the occasion of serious fighting the number of the wounded may make it impossible for the requisite amount of time to be spent on individuals, especially those less seriously injured. Lastly, unavoidable delay in transport may result in extension of infection and conversion of a promising case as it left the casualty clearing station into one arriving at the general hospital in a highly unsatisfactory condition.

Happily, whatever the initial procedure and application may have been, in many cases the young and healthy patients arrive in good general condition, the local wound progressing satisfactorily, in some instances devoid of any serious infection. In a considerable proportion, however, men are admitted suffering, both generally and locally, with every grade of infection from the slight to the most severe. The former class present little difficulty, the wounds heal readily under any form of simple application, or, as a time-saving and precautionary measure, the smaller wounds may be completely excised and the gap sutured. The latter method, especially advocated by Colonel H. M. W. Gray, has been attended by success in his own hands and in those of other surgeons, particularly in the case of uncomplicated scalp wounds or the smaller multiple injuries inflicted by fragments of shells or bombs.

A vastly more difficult problem is presented by patients arriving in the stage of acute development of infections. The wound has already been primarily opened up and cleansed, and the question arises whether further surgical interference will effect improvement or lead to increased extension of the infective process. On the one hand, it is evident that the patient is suffering from an exacerbation directly due to the disturbance involved by transport; on the other, the possibility is always present that delay, even of a few hours, may allow such progress as to render any further intervention useless. A rough-and-ready distinction between cases in which clinical evidence suggests anaërobic or aërobic infection respectively to predominate forms the most useful guide. In the former case delay may be fatal to life or limb, in the latter an interval of rest often results in a rapid subsidence both of local signs and general symptoms, and no further incision may be required.

Patients arriving at the general hospitals may have been submitted to several varieties of primary wound treatment. Speaking generally, the principles adopted have consisted in the maintenance of rest, moisture, and an antiseptic application. In the earlier stages of the campaign numerous antiseptic solutions were employed, also the hypertonic saline solution, but of late, in the great majority of cases, solutions of which the active constituent is chlorine have found most favour and have proved the most satisfactory in practice. Eusol, and with gradually increasing frequency the Dakin-Daufresne solution of hypochlorite of sodium, are those now most commonly resorted to. In the case of the former, moist gauze dressings, in combination with ordinary rubber drainage tubes, have been generally employed; for the latter the technique of Carrel is used.

A smaller number of cases have been treated by other methods, such as primary suture, the salt pack, closure after the introduction of a mixture of iodoform, bismuth subnitrate and paraffin (Rutherford Morison's method), a solution of brilliant green, etc. A word may be added regarding the salt pack method advocated by Colonel H. M. W. Gray. This method, consisting in a thorough packing of every crevice of the wound with gauze, between the layers of which tablets of sodium chloride are enclosed, is suitable for wounds of the large funnel type or of a superficial nature. It is not safe for tunnel wounds, wounds implicating the large vessels, or highly comminuted fractures. The early action of the sodium chloride is inhibitory, and gives no aid to the healing process; indeed, the tablets, even when enveloped in gauze, cause local necrosis of the tissues opposite to them. On the other hand, wounds dressed in this manner may be left untouched in many cases for a week or ten days, during which period the patient's general condition remains excellent. The pack, acting as a foreign body, excites a local reaction around the wound, with a consequent narrow wall of inflammatory infiltration which protects the general system from the absorption of toxic products from the wound. Suitable cases dressed in this manner arrive in a surprisingly good condition at the general hospitals, and the wounds do well with subsequent cleanly antiseptic treatment. Subsequent introductions of the pack are neither conducive to rapid closure of the wound, cleanliness, nor the amenities of the ward, and are undesirable.

It may be well here to mention the experience which has been gained as to three points in the technique of the treatment of septic wounds—drainage, irrigation, and baths.

Drainage.

The methods of maintaining the free escape of septic discharges from the wound have undergone considerable modification, although no doubt has arisen as to the cardinal importance of the principle to be carried out. In the earlier stages of the war it was effected mainly by the introduction of rubber tubes of large calibre and other devices, and these were retained for prolonged periods at the general hospitals. The objections to this method—the tendency of the tube to form for itself a localized channel useless for general escape of fluid, the presence of a foreign body in the wound capable of exercising injurious local

pressure, the establishment of a track by which infection could be freely conveyed from the surface to the depths of the wound cavity, and lastly, the difficulty of determining the moment at which the tube might be safely removed after its prolonged stay—were obvious, but they were faced for a time in view of the very serious infections that had to be dealt with. A revulsion, however, soon followed, in consequence of the unsatisfactory results attained, and the tube is now retained as a provisional measure, and in many cases not employed at all. The main element in the decreased use of the cylindrical tube has been the introduction of what may be called the "curtain" method. This is well illustrated in two forms by Carrel's and Rutherford Morison's systems respectively. In Carrel's the wound surfaces are kept apart not by the small tubes employed for the purpose of instillation, but by the layer of fluid constantly renewed between them and the light gauze packing introduced to retain it. In Rutherford Morison's, a thin layer of an antiseptic medium covers every part of the surface of the exposed tissues, and forms a curtain or cleft which allows for the escape of such fluids as may collect within the wound. The drainage effected by the salt pack is of a similar character, supplemented by the absorptive power of the pack itself before it becomes thoroughly impregnated with the discharges.

Irrigation.

Continuous irrigation has greatly lost in favour; it has the primary objection of inconvenience to the patient, while experience has demonstrated the difficulty of preventing the fluid from forming definite runlets, and consequently of ensuring the flow of the fluid employed over the whole surface of the wound. Its use has consequently been more and more restricted; and, except in the form of a periodical flush, irrigation is little employed.

Baths.

Antiseptic baths have also lost in favour with the development of more effective antiseptic methods. Beyond the obvious difficulties of so arranging the limb as to avoid pressure and swelling (a difficulty, by the way, much diminished by the excellent form of bath devised by Captain M. Donaldson), the bath entails the serious disadvantage, in dealing with a septic limb, of the impracticability of preventing hurtful movements of the part.

At the present time the most successful results that are being attained in all forms of wound are undoubtedly those in which the Carrel-Dakin method is employed. This method has not only shown itself successful in the early treatment, but also in the later treatment of septic wounds, even in the stage of chronic established suppuration. It has been definitely proved that simple flesh wounds dealt with during the first twelve hours after infliction can be rendered practically sterile in an average of six days, those dealt with later in an average of twelve days, that compound fractures may be sterilized within three weeks, and that all three classes of case may be secondarily sutured and closed at these dates. Economy in time, diminution in the risks of secondary complications, increase in the comfort and well-being of the patient during treatment, are all ensured by the method.

It also ensures what has become the supreme object in dealing with septic wounds, the possibility of early secondary suture. The importance of using a bacteriological test to determine the date of closure of the wound cannot be too strongly impressed if anything like habitual success is to be attained. Opportunity has not yet been afforded for the trial of the method during a great rush of wounded men, but arrangements have been made to carry it out if possible. Even should this prove impracticable, the system can readily be carried out in quieter times for a very large number of patients. It has one obvious advantage over any other method of treating septic wounds, the production of a thin supple scar, not likely to interfere with the mobility of the parts, or to cause trouble by subsequent contraction.

The alternative method of secondary closure (that of Rutherford Morison[1]) avoids the tedious process and careful manipulation essential to the success of Carrel's method, saves much time on the part of both surgeons and nurses, and the patient has not to undergo the discomfort of repeated dressings. Little experience has yet been gained of its suitability as a primary procedure, but in infected suppurating wounds it has attained great success. It must, however, be allowed that the cicatrix obtained is very inferior to that which follows the use of Carrel's system, from the initial period onward, and the inclusion of particles of bismuth and iodoform has some disadvantages, both immediate and remote. One great advantage of Rutherford Morison's method is also lost in the cases treated by it in a field ambulance or casualty clearing station—the patients must undergo transport with its consequent shaking and disturbance of the wound; hence patients with the slighter injuries, whose wounds have been closed by this method often arrive with the composition escaping from a wound in which little or no union has taken place, and no appreciable benefit has been conferred.

While it may be said fairly that the Listerian principle has been more nearly attained by the method of Carrel than by any other in use, and that the results are of a very satisfactory nature, yet it must still be allowed that an ideal antiseptic medium remains to be found, especially in respect of consistency of strength and persistence in action. In both respects the bismuth iodoform methods offer some advantages to make up for the cruder character of the cosmetic results obtained. In France the surgeon, like the modern Jew, still awaits the advent of the Messiah; perhaps that advent is near in the person of flavine. Meanwhile, we rest in hope and happy in the firm belief that "the stimulus of imperfection taking place immediately calls forth the action of restoration," and the struggle is maintained to further the great principle, "the first and great requisite for the restoration of wounded parts is rest, as it allows that action which is necessary for repair to go on without interruption," a struggle which only the military surgeon on active service can fully appreciate.

SECONDARY HAEMORRHAGE.

In the light of modern surgery this accident has been deplorably common, and though but little new has emerged from the experience of the war, a few remarks upon the subject seem warranted, the more so in that the increasing frequency with which transfusion of whole blood has been employed to counteract the effects of the accident does show some advance in treatment.

As a manifestation of septic infection, it is obvious that improved methods of wound treatment offer the best chance of reducing the frequency of secondary haemorrhage, and it may be confidently stated that with the development of more satisfactory methods the accident has become less common. Still it must be recognized that in dealing with gunshot wounds we are likely to be of necessity limited to the process of secondary sterilization of an infected wound; further, that we stand in the face of a variety of wound in which incomplete primary lesions of the blood vessels are more common than in any other. The eventual perforation of the vessel wall, therefore, is up to a certain date more commonly the result of the separation of a slough of primarily devitalized tissue than due to the extension of a process of ulceration from without.

One or two special features may be emphasized in connexion with secondary haemorrhage from gunshot wounds. It may, of course, occur from any large vessel, or in old toxaemic or septicaemic subjects it may be of the parenchymatous variety. Given this generalization, however, we find that certain vessels are much more commonly the source of bleeding than others. The localization is determined by the degree of fixation of the vessel and the firmness of the bed upon which it lies. Thus the circumflex branches of the axillary artery, the subscapular or posterior scapular vessels in proximity to the scapula, the gluteal artery, the articular branches of the popliteal artery, the circumflex branches of the profunda femoris, the femoral artery in the lower part of Hunter's canal, and the anterior tibial artery as it lies on the interosseous membrane, are all common sites, and, it may be also remarked, troublesome ones in which to deal comfortably with the injured vessel. Another peculiarity is the comparative frequency with which large trunks in mobile positions, such as Scarpa's triangle, may escape damage by displacement and lie exposed on the surface of a large open wound. Such vessels may not infrequently have suffered contusion with consequent thrombosis.

As to the general treatment of these injured vessels,

little new has been evolved; direct local ligature, prolonged forcipressure, or at the last extremity local plugging, are still the means on which the surgeon must depend. On rare occasions, as an emergency measure, a proximal ligature may be applied, but this is rarely successful and often harmful. A single exception to this rule must be allowed in the case of uncontrollable haemorrhage from wounds of the gluteal region; here in several instances ligature of either the internal iliac artery or its posterior trunk has proved a successful measure.

The proper method of treatment of an exposed arterial trunk, whether thrombosed or not, has opened up a question upon which the civil surgeon rarely has to form a decision. It may be broadly stated that the line of treatment depends mainly upon the degree of septicity of the wound of the surrounding soft parts. If the arterial coats are not seriously damaged and the wound be in a condition likely to respond to antiseptic treatment, an expectant attitude should be assumed if the vessel be pervious. If, on the other hand, the artery is thrombosed, the right course is to place ligatures both above and below the obliterated portion of the vessel, because such arterial thrombi in any case result in permanent occlusion, while in many instances the vessel may give way at the limits of the clot, a solid cylinder, like a pencil, coming away with great risk of haemorrhage; beyond this the clot provides a possible source of a peripheral embolus.

As to the general treatment of patients in whom a secondary haemorrhage has occurred, internal styptics such as calcium lactate have proved useless. This is easily intelligible in the case of the larger vessels, for in such a more or less rounded opening is usually present, the occlusion of which by a mural clot is of no more than very temporary use, while a local thrombus obstructing the whole lumen is unlikely to form. Even in cases of the parenchymatous variety internal remedies have proved useless.

The main advance in treatment has consisted in a return to the practice of transfusion of "whole blood," which has in great measure displaced the unsatisfactory saline infusion. For the popularization of this method we are mainly indebted to our Canadian colleagues in France. Several methods have been employed—the Kimpton tube, the Unger two-way stopcock, direct connexion of the radial artery of the donor with the vein of the recipient by a paraffin-coated rubber tube provided with silver cannulae at either end, the employment of a series of Record syringes, or the citrated method.

Papers have been written on this subject by E. Archibald,[2] L. Bruce Robertson,[3] A. Fullerton, G. Dreyer, and H. C. Bazett.[4] The number of cases published is not large; the latter authors include nineteen with eight recoveries. A large number of patients have, however, been treated over the whole army area, and a generally favourable opinion as to the results has been established. It must be remembered also that a very unpromising type of case has often been selected. Generally speaking, the good results have been obtained in cases of pure anaemia; when the anaemia has depended in part on haemorrhage, in part on septic infection, the procedure has not been satisfactory. Again, it has been more frequently successful as a measure in primary than in secondary haemorrhages.

Military conditions have allowed small opportunity for preliminary haemolytic tests applied to either donor or recipient, but, when practicable, a small preliminary transfusion of 10 c.cm. of the donor's blood has been made the day previous to the main procedure; accidents due to haemolytic reaction have not, however, been common. In one case, under the observation of the writer, the patient passed highly blood-stained urine for the succeeding thirty-six hours, but he recovered with no further bad symptom. In a few others alarming symptoms have passed off with no further result when the transfusion was discontinued, and two patients have probably died as a direct result of the treatment. Ill effects have not been sufficiently numerous, however, to raise the question of justifiability in the desperate cases for which the procedure is undertaken.

GAS GANGRENE.

This complication has been already dealt with, as it is met with in the field ambulances and casualty clearing stations. Naturally the most acute cases do not reach the hospitals on the lines of communication, and of late, coincidently with the development of the clearing station accommodation and the general acceleration of the transport of patients consequent on a shorter and quicker journey, fewer cases of the most serious nature arrive. None the less, the insidious manner in which the process starts, the rapidity with which it spreads, and the tendency which exists for delay in its development, all tend to maintain a constant supply of cases to the general hospitals.

Some early conceptions of the disease have undergone considerable modification; thus it was assumed, in consequence of the frequency with which the limbs are attacked and the fact that extension from the limbs to the trunk is commonly confined to the subcutaneous tissues, that the trunk itself was seldom primarily affected. More extensive observation has shown the fallacy of that assumption, and it is now well known that the contents of the cranial cavity, the pleurae, the pericardium, the peritoneum, the retroperitoneal tissue, and the muscular planes of the trunk are all attacked with varying degrees of frequency. The implication of the great body cavities, however, offers some special features; thus the infection is usually primarily of effused blood or blood clot, and in consequence of the resistance of freshly effused blood to the growth of the organisms, the exacerbation of symptoms is, as a rule, retarded for several days, or even a longer period. The symptoms in such cases offer a remarkable resemblance to those of a sudden internal secondary haemorrhage, a fact that in early days sometimes led to confusion.

Another question which is at present undetermined is the relative frequency with which patients die from a pure toxaemia, or of an actual septicaemia. The number of instances in which organisms have been observed in or cultured from the blood is relatively few, a remarkable fact considering the rapidity with which the entire vascular system is invaded after death. Certain observations, however, beyond those made upon the blood afford definite evidence that at an early stage a general infection is not uncommon. It was remarked at Boulogne in an early stage of the campaign that certain patients arriving with gaseous cellulitis of the limbs had at the same time local patches upon the trunk or arms at the sites of previous punctures for the injection of tetanus antitoxin, or even morphine injections; further, that similar phenomena might follow the introduction of a saline infusion. Again, cases were observed in which gas was voided with the urine, and in one of these a culture of *B. perfringens* was made from the urine. Further, a less striking occurrence, as the tendency of these infections to cause local thrombosis is well known, a certain proportion of the patients developed metastatic deposits in other parts of the body. It may be observed that one of the most common seats of these latter, the opposite buttock, is not always free from the suspicion of being a direct extension.

In other cases the rapidity of the process suggested a pure toxaemia, and some support to this view is found in the rapidity with which the limbs in some cases enlarge from a toxic oedema independently of the presence of gas. Major Rowland found that the filtered fluid from such cases caused general oedema and death in a few hours when injected into rabbits or guinea-pigs independently of the presence of any organisms, and was working on this subject at the time of his death.

The factors determining the mode and rapidity of extension of the process have also given rise to much interest. Certain facts appear to definitely favour the view that the process is a true cellulitis, although the frequency and extent to which the muscles suffer has led some observers to speak of the anaërobes giving rise to the condition as muscle feeders. It may be premised that the organisms concerned can establish no footing in the body in the absence of either dead tissue or some foreign body, and, this fact granted, it is obvious that the localization of the dead matter will correspond with the commencement of the process. Since the establishment of the fact by Major Curtis Webb,[5] that *x*-ray examination allows the determination of the presence of gas in the tissues, this method of examination has been widely employed as a means of diagnosis, and the examination of an entire limb by this method (Major Littler Jones) affords some striking information. If, for instance, the quadriceps muscle of the thigh has been wounded, the gas may invade the entire muscle, but the extension will be

seen to follow the course of the great vascular cleft to the leg and even the foot, being localized, in the early stage at least, to the cellular tissue. Again, clinically, the extension of gas from the upper to the lower part of the thigh may sometimes be evidenced by a characteristic elongated swelling following the course of the vessels. Then, with regard to the intimate structure of the muscle itself, the separation of the individual fibres appears to indicate a similar process.

The rapidity with which the cellulitis spreads and destruction is caused appears to depend on the one hand on the tension in the special area affected, and possibly on the virulence of the organism or group of organisms concerned; on the other, on the degree of interference with the vascular supply either by the original damage or by subsequent thrombosis of the vessels concerned. Captain Bashford[6] has dealt with both these questions. The clinical observation of the rapid development of massive gangrene in a limb subsequently to the ligature of the main artery, or again the rapid death of that part of a long muscle cut off from its arterial supply, is common enough.

As to the actual organisms or combination of organisms responsible for the gangrene in its special forms, which may determine either the soft oedematous limb or the tight drum-like, or the emphysematous varieties, no definite knowledge exists. Captain Henry has furnished a short summary (printed at page 806) of the important series of observations carried out by himself[7] on the organisms concerned.

Another point of interest in this relation not cleared up is the absence of knowledge as to what determines the rapid haemolysis in one case accompanied by the development of more or less intense jaundice, while other patients present merely the appearance of extreme anaemia before death. Generally speaking, the anaemic patients are those that die most rapidly, and the difference may depend simply on time, since the characteristic brilliant orange-coloured discharge from the wound met with in mixed infections is rarely observed before the third or fourth day. The actual deficiency in the volume of blood in the cases of rapidly fatal issue is indicated by the low tension of the pulse as determined by palpation, and a loud knocking sound in the great arterial trunks, which gains the same intensity as it does in many patients dying from pure haemorrhage, and consequent fall in the diastolic pressure.

Such advance in methods of treatment as has been made rests entirely on the knowledge of the danger of leaving dead infected tissue or foreign bodies in the wound, and the necessity of relieving all tension in the structures affected; thus the knife is still our only aid. In making incisions for the relief of this form of cellulitis it may be remembered that size is of minor subsequent importance, provided the incisions are so planned as to avoid important structures and to allow of subsequent secondary closure. The latter is of special importance since the wounds infected by anaërobes often rapidly clean, and form some of the best for secondary closure at a comparatively early date.

Where amputation is indicated, the one principle to be adhered to consists in the maintenance of an open stump. It has been found that under these conditions, even where the amputation has been made through oedematous tissue, the latter drains freely and no further extension takes place. Beyond this, oedematous connective tissue, especially that of the green variety, is often found to be sterile, hence the inadvisability of interfering with it, particularly around the vessels and nerves, and thus opening up the planes of the limb to further infection.

Sir Almroth Wright,[8] in a paper on the conditions which govern the growth of the bacillus of gas gangrene in artificial culture media, in the blood fluids *in vitro*, and in the dead and living organism, has made the suggestion that intravenous injections of sodium bicarbonate may prove a means of combating the toxaemia, and gives short details of six patients treated by this method, of whom two survived. He assumes that in the treatment of the so-called "gas gangrene infections of man" he was dealing essentially with the same phenomena as those observed in certain laboratory experiments which showed that the bacillus of Welch, when grown *in vitro* in serum, diminishes the antitryptic power of the medium and renders it acid, thus converting the serum into a pre-eminently favourable medium for the growth of the bacillus. Experiments on the blood in the dead body showed that it is these chemical changes which furnish the conditions required for the avalanche-like progress of the bacterial infection. Finally, experiments on living animals showed a reduction in the alkalinity of the fluids taken from the focus of infection, and a reduction in that of the circulating blood—also an increase in the antitryptic power of the blood, combined with a diminished or abolished antitryptic power in the infected tissues.

In his investigations of the disease in human subjects he found the same high antitryptic response in the circulating blood and the reduced or abolished antitryptic power in the infected tissues or infected effusions, combined with diminished alkalinity of both tissues and effusions—thus, a local acidosis but also an acidaemia, the latter being found when an infection has culminated in "gas gangrene toxaemia."

TETANUS.

Tetanus, the terrible scourge which gave rise to so great anxiety in the autumn and early winter of 1914, has become a comparatively infrequent wound complication since the adoption of prophylactic injections of antitoxin in all cases of wounds and in cases of "trench foot" accompanied by vesication. Nevertheless cases still occur, in some instances because the primary injection has been given late as a result of the patient not being able to be "collected" from the zone of fire, a few men escape treatment as a consequence of the number of wounded needing to be dealt with after a serious engagement, and special idiosyncrasy may account for others. At an early date it was also recognized that the protective influence of the antitoxin is often exhausted at the end of eight or ten days; hence a general order was given to the effect that the injections should be repeated at intervals of seven days in all cases of serious wound and to patients whose wounds were not progressing well.

The cases met with include every degree and variety of the disease. Thus very acute cases with general spasms, slight cases in which trismus is the main feature, cases of "head tetanus," either of the paralytic class or with clonic spasms of the muscles of mastication, splanchnic tetanus, local tetanus of the limbs, sometimes remaining confined to the wounded member, in others becoming general, and cases of the so-called delayed class. In one remarkable instance of the last variety the patient, who had been sent to England in August with a small wound of the buttock, at the bottom of which was a small retained foreign body, returned to duty two months later. When on duty in the trenches stiffness of the corresponding limb, at first ascribed to sciatica, developed, and later general tetanic symptoms. Active treatment with antitoxin was followed by an uninterrupted recovery.

Accumulated experience has negatived the utility of treatment with carbolic acid or magnesium sulphate, both of which remedies were vaunted in the early stages of the campaign. Curative treatment by antitoxin is still upon its trial, and considerable differences of opinion exist both as to its utility and as to which route should be chosen for its exhibition. The subcutaneous route is generally considered unsatisfactory on account of the delay in conveyance of the antitoxin to the required area; hence, although generally chosen for prophylactic purposes, its use as a method of curative treatment is restricted to an auxiliary rôle. The intermuscular route has found more favour, although its efficacy is doubted by many. The intravenous route has not been shown to be specially efficacious, and as accidents of an anaphylactic character have followed its use it has been practically abandoned. The general applicability of the intrathecal route is still under discussion; the chief objection to its use lies in the large quantity of serum which requires to be introduced and the comparatively serious nature of the procedure itself if repeated injections are made. In some cases a definite disturbance of the intracranial pressure appears to result, and in some local inflammatory changes in the spinal theca have occurred. In spite of these objections the intrathecal method has been very largely employed, and a trial is now being made of a highly concentrated antitoxin.

The prognosis has depended in individual cases on the length of the incubation period, and, in spite of treatment,

the mortality has remained above 70 per cent. of all cases treated. Symptomatic treatment by chloral and morphine, particularly the former, has retained its character both in the relief of suffering and as curative, in so far as it tends to delay exhaustion dependent on the spasms.

OTHER WOUND INFECTIONS.

Little new can be said regarding the remaining forms of wound infection, but it may be generally stated that the antiseptic solutions depending upon chlorine for their active element have proved the most successful application. One form of streptococcus infection deserves special mention as possibly corresponding to the variety of "classical hospital gangrene" described as the membranous. Cases of this nature have not been common, although sufficiently so to have become familiar. A wound which has previously been apparently progressing favourably becomes covered with a dense grey tough membrane, firmly adherent to the subjacent granulations. In the earliest stage this membrane does not materially differ from the thin layer of coagulated fibrin and included leucocytes which not uncommonly forms in cases of streptococcic infection which after a time fail to respond to treatment. The same cessation of free discharge from the wound surface is observed, a condition well described by Colonel Sir Almroth Wright as "lymph bound." The membrane then thickens so as to resemble one of the diphtheritic class; in fact strong suspicion was aroused in the earlier stages of the war that the change was due to a diphtheritic infection. Bacteriological examination has, however, in all cases resulted in the discovery of streptococci alone. With the development of the membrane a continuously increasing hard white oedema spreads up the limb or on to the trunk, the patient meanwhile suffering with pronounced signs of toxaemia. Incisions into the oedematous area give rise only to the escape of a small amount of serous discharge, and the tension wounds tend to dry up with little change. Amputation is usually followed by a recurrence of the same type of wound surface, and the patient dies in from four days to a week's time after the commencement of the process. No successful method of dealing with this special form of wound infection has been devised.

SEPTICAEMIA.

The most common form has been in connexion with streptococcal infections. It cannot be said that any advance has been made in the treatment of this condition. Encouraged by the results published by Messrs. Fraser and Bates[9] in dealing with some acute general infections, and the work of Lorrain Smith and his colleagues, a more or less extended trial has been made of intravenous injections of hypochlorous acid in the form of eusol, but no satisfactory results have been obtained. The same remark obtains to a more limited trial with colloid chloride of gold. The work of Dakin has shown that the antiseptic power of injections of eusol must be small in consequence of the minute amount of the antiseptic in proportion to the volume of the patient's blood. If either this solution or that of chloride of gold can effect any useful purpose, it is probably only by exciting as irritants a certain degree of activity in the endothelial lining of the blood vessels, and in neither case has this proved sufficient to serve the purpose aimed at of sterilizing the blood.

INJURIES TO THE GREAT VESSELS.

The dangerous nature of injuries to the great vascular trunks has been amply demonstrated by the fact that, except one or two injuries to the innominate vessels, the subclavian artery in the thoracic part of its course, and possibly a few iliac (although the writer has seen none of the latter amongst over 300 carefully examined cases of injuries to the larger arteries), injuries to the vessels of the trunk have been conspicuous by their absence on the lines of communication.

A considerable experience has been gained regarding the effects of contusion of the vessels, which has in the main substantiated the French pre-war experimental observations. At the same time, the occurrence of single simple linear fissures of the intima has been a more common form of lesion than one would have been led to expect. The chief importance of these lesions has been in connexion with secondary haemorrhage, to which allusion has already been made, and in the frequency with which the injury is followed by thrombosis. Several instances of subsequent embolism have been observed, this particularly in the case of the cervical vessels, where cerebral embolisms are readily detected as a consequence of the obvious signs with which blockage of the cerebral vessels is attended.[10 11] This experience, combined with that of similar accidents occurring in connexion with actual wounds of the vessels, raises the question of how great a proportion of the instances of gangrene of the extremities following injuries to the vessels of the limbs, either spontaneous or following ligature, is due solely to the local occlusion of the main vessel. It seems likely, if all these cases could be thoroughly investigated, that embolism in the distal circulation plays a more important part than has hitherto been accorded to it, since several observations have been made of its occurrence.

The frequency with which various forms of missile have been employed has been followed by considerable change in the nature of the lesions, the highly contused lateral wound of the artery, and the clean perforation made by the modern bullet, have of late been less in evidence than extensive lateral lacerations and more or less limited lateral perforations caused by fragments of shells or minute fragments derived from bombs. Occlusion of wounds of the vessels by retained shell fragments, the removal of which has been followed by free haemorrhage, has not been rare. On the other hand, instances of missiles entering and travelling along the blood vessels has rarely been observed. The most striking instances have been those in which shrapnel balls have obtained entrance to the heart or large veins of the trunk and travelled downwards by gravitation. The most interesting feature of these cases, observed also in some wounds of the inferior vena cava, is the moderate degree of primary haemorrhage which had taken place.

Wounds of the great vessels arrive in the hospitals on the lines of communication usually some days after their infliction, but a considerable proportion may arrive at an earlier date in consequence of the absence of primary haemorrhage, or the coexistence of some more serious or more easily recognized injury having allowed them to be overlooked. This is especially the case in multiple bomb or shell injuries, where one out of twenty small wounds produced by as many fragments widely distributed over the whole body may have implicated an artery; or in the case of severe fractures of the long bones, accompanied by great swelling of the soft parts.

The result of this experience has been greatly to widen the scope of the stethoscope in the diagnosis of arterial injuries, since auscultation will often reveal the presence of the pathognomonic systolic bruit, when the absence of local pulsation in the swollen area and the presence of pulsation in the distal arterial circulation may, if depended upon alone, lead to a serious error in diagnosis. Further, it has been observed that the local vascular bruits may, in some third of the whole number of injuries to arteries of the lower extremity, and less frequently in other vessels, be conveyed to the cardiac area, and distant vascular lesions have in some cases been detected by the presence of the apparently cardiac murmur.[12] This phenomenon is observed both in pure arterial and arterio-venous injuries. It has also been observed that the distal blood pressure of the limb is materially lowered in the presence of a lateral arterial lesion—in fact, practically to the same degree as if the main vessel has been occluded.

As a consequence of the period at which arterial injuries reach the hospitals on the lines of communication the treatment has been for the most part expectant, the large majority of the patients being evacuated to the base in England. The importance of rest in allowing subsidence of the general circulatory excitement, and the consolidation of the aneurysmal tumour, has been obvious. It is also held that during this period the enlargement of the collateral circulation makes some progress. Some evidence in favour of this view is offered by the fact that the nutrition of the limb is not observed to suffer during this period, while wasting, sometimes of a rapid character, often follows the performance of necessary ligation.

Accidents during this probationary period have not been common: gangrene has been rare; secondary haemorrhage uncommon, unless the wounds were large and badly

infected; and suppuration of the aneurysm has been an accident of extreme infrequency.

Active treatment has consisted in the main of ligature of the vessels. This has been indicated for extension of the blood effusion within the limb, secondary haemorrhage, signs of pressure on the trunk by increasing size and firmness of the false aneurysmal sac, or signs of inflammation. When the hospital accommodation has allowed a sufficiently long stay a certain number of cases have been operated upon in the absence of any untoward symptoms.

For purely arterial injuries, ligature of the vessel above and below the wounded spot has been the most common operation. In a number of these cases the main vein has been found to be thrombosed, but this accident has not had any adverse influence on the result. The same statement may be made as to the results observed when coexisting wound of the vein has made it obligatory to tie both vein and artery, or in the cases where the main vein had already suffered complete division and occlusion. The same experience has followed ligature of both artery and vein above and below the communicating channel in arterio-venous aneurysms or aneurysmal varices. Hence it has been claimed[13] that simultaneous occlusion of both artery and vein is a negligible occurrence with regard to any increase of risk to the vitality of the limb. Further, that insomuch as a better balance is maintained between the arterial and venous elements of the collateral circulation, and the blood pressure within the limb increased, the operation is preferable to that confined to the wounded artery alone.

In certain vessels—for example, common carotid, common femoral, popliteal—after ligature of which acute local anaemia and gangrene is specially liable to follow, a limited trial has been made of Tuffier's tubes to maintain temporarily the main current pending the increase of the collateral circulation. In a small series of eight cases (common carotid 1, axillary 1, femoral 2, popliteal 4) in which this method was used, in no instance did gangrene take place. In one femoral case, in which the tibial pulses were absent at the time of operation, feeble pulsation returned and persisted for a few hours, and in the second the foot, which had been cold, at once became warmer and remained so. Such evidence as has been obtained, however, does not suggest that the maintenance of the main current persisted more than a few hours, and the clots expressed from the tubes when removed on the fourth day, although firm in comparison with the terminal projecting into the proximal end of the vessel, did not suggest a very gradual formation. Moreover, in one of the popliteal cases, in which it would have been difficult to place a ligature on the lower end of the artery, it was not found necessary to do so, as the vessel was closed by a firm thrombus. Such experience as has been gained is, however, definitely in favour of a more extended trial of this method.

Suture of the vessels, either end-to-end or lateral, has been employed only in few cases. At the period during which the patients are still in the hospitals on the lines of communication the vessels are still comparatively fixed and difficult to free without damage to the coats, as well as rigid in themselves; hence, if sutures are introduced, the tension upon them is far greater than is the case with normal arteries. Again, a large proportion of the wounds are too extensive for anything but an end-to-end union after removal of the damaged extremities of the vessel, and here again both local tension and an undesirable temporary flexion of the limb to reduce it are opposed to successful suture. Cases, however, do occur in which either form of operation can be carried out. In a small series of six operations the following immediate results were obtained:—Brachial 3: (*a*) Lateral suture, lumen of vessel reduced more than one-third; no radial pulse before operation, but it returned four days after. (*b*) Refreshment of ends and end-to-end suture. Radial pulse palpable after operation and persisted. At the end of the third week the distal blood pressure in the limb had risen by 22 mm. of mercury. (*c*) Excision and end-to-end suture. Radial pulse absent during first two days after operation, then returned. Five days after the operation the distal blood pressure was 30 mm. of mercury greater than before. Popliteal 1: Lateral suture. A good anterior tibial pulse was present the day after operation, but the posterior tibial was absent. Femoral 2: (*a*) Lateral suture of an arterio-venous communication of six months' standing. Distal tibial pulses present at the end of the operation and persisted. (*b*) Lateral suture in Hunter's canal. Tibial pulses absent before operation, but were just palpable four days later. Distal blood pressure still 50 mm. of mercury lower than in other limb.

Time and a considerably more extended observation is needed to determine whether the operation of suture does attain very much better results than simple ligature. The above results, including no sort of accident, seem to do little more than prove that the operation is practicable and not dangerous in selected cases. That a patent lumen is preserved in the vessels in the majority of cases is, however, not yet proved.

In a case of large wound of the thigh, in which the foot was cold and no tibial pulses were palpable, the femoral artery was discovered to be thrombosed 2 in. above the apex of Scarpa's triangle and no pulse could be felt in Hunter's canal. Captain Cowell made an incision one-third of an inch long into the vessel and squeezed out a small decolorized thrombus and a red clot 3 in. in length from the vessel distal to the incision. The vessel was then sutured, and pulsation returned in Hunter's canal but was not palpable at the ankle. A secondary thrombus again formed and obstructed the vessel. It appears probable that if the intima has been sufficiently injured to cause a primary thrombus to develop, operations of this class are not very likely to succeed; still a repetition is probably worthy of trial.

FRACTURES.

At an early stage in the campaign, when wounded men were streaming in large numbers into the improvised hospitals in Boulogne, it became evident that neither the regulation outfit of splints nor the supply of emergency splints manufactured by the mechanics attached to each hospital unit sufficed to cope with the large number of fractures admitted. An opportune paper by Lieutenant-Colonel Robert Jones which appeared about this moment[14] moreover impressed all those concerned in the treatment of these injuries with the enormous advantages offered by splints of the H. O. Thomas class for military use, both in facilitating the early and safe transport of patients, and in allowing efficient extension of the limbs to be continuously maintained. Further, a number of modifications of the type of splints which have subsequently proved of much value were quickly in demand. In order to meet the requirements thus suddenly arising, application was made to the Medical Director-General at the War Office for the supply of a skilled surgical mechanician to undertake the control of a central splint manufactory at Boulogne. Mr. Salmon was sent out, and since that time an enormous number of splints have been manufactured locally, and supplied not only to the general hospitals on the lines of communication, but also to advanced units throughout the army. It would be difficult to overestimate the practical value of this establishment.

The first question which has arisen in connexion with these injuries is the relative importance of the primary treatment of the wound of the soft parts, or the adjustment of the bony fragments themselves. Cases may occur in which either assumes the first place—thus the limb may be threatened by anaërobic infection; reduction of the displacement and maintenance of the bone in position may prove a matter of extreme difficulty as a result of the position and direction of the fracture; or the presence of multiple wounds in inconvenient positions may render it impossible to apply such apparatus as will maintain sufficient extension. Under any of these circumstances treatment of the wounded soft parts may claim priority, but as a general rule the principle of prompt reduction of the displacement and maintenance of extension has been adhered to. It has been recognized that secondary efforts at reduction when a septic wound has cleaned and settled down is a serious operation involving risks of lighting up again a condition which has been with difficulty overcome.

The next question which arises is whether rigid extension in the direct long axis of the limb is to be maintained or the joints placed in the flexed position. For patients treated in France the former method has been the more widely adopted, in order to utilize the facilities in transport which the Thomas's splints undoubtedly offer. As an invariable custom, however, this practice has not been able to be followed, as many surgeons have not been able to obtain good position of the fragments in such

positions as the upper and lower thirds of the femur. To meet this difficulty the Thomas's splints have been bent or other methods employed. For instance, Hodgen's splint for the upper third of the thigh bone, or a swinging frame of the same dimensions of the bed, the feet being fixed by plaster extension strips to the angles of the lower end, and the head and body lowered (Major Sinclair). For the lower third the wire double-inclined plane of Hey Groves has occasionally been employed. All these methods, however, require additional attention and longer stay in France, hence they have not been widely resorted to.

The method of maintaining extension has also been a question much discussed, and fixed extension by a stirrup attached to the end of the Thomas's splints has been commonly adopted. Yet in a large number of cases weight and pulley extension has been preferred and is sometimes necessary. The question, in fact, has not been settled in favour of either of the opposing parties.

A third method, that of a continuous screw, has also been considerably employed, both in conjunction with the type of Thomas's splint with a spat attachment, in the Wallace-Maybury modification of the Thomas, and also in the bent Thomas's splints and their modifications for treating fractures of the humerus with the elbow flexed.

The use of the pin transfixing either the lower end of the femur, or the upper extremity of the tibia, for the attachment of extension apparatus in cases of fracture of the femur, has found little favour in France. This has perhaps mainly depended on unwillingness to make a fresh wound in a limb already the seat of a septic wound; but beyond this, the fact that practically all patients need to be transported at an earlier date than would be convenient for removal of the pin renders the method undesirable.

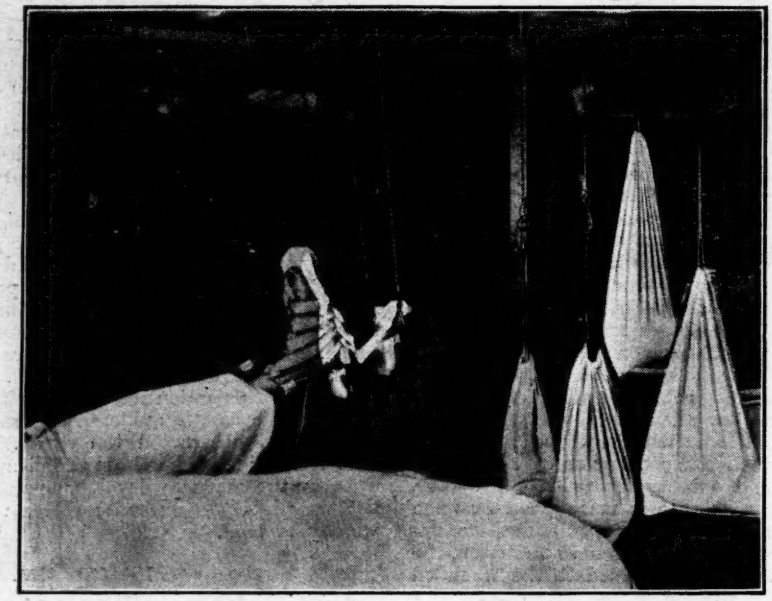

FIG. 2.—The Thomas Splint with Foot Extension, Suspended (Major Sinclair). The foot extension is applied by means of 3 in. strips of flannel bandage, each strip being threaded through two metal triangles. One set of six triangles is aligned along the inner margin, another set of six along the outer margin of the sole. The flannel strips are glued to the sole, sides and dorsum of the foot, care being taken that the ends do not meet over the dorsum. Cotton-wool is dabbed over the glued area to hasten and strengthen the setting. Whilst the glue is drying the Thomas splint is applied in the usual way and fitted with a support to keep heel clear of the bed. The triangles are now threaded with tapes, which are passed over the serrated edges of the special wooden foot-piece and tied. This foot-piece rides on the side bars of the Thomas splint. The foot, now being secured to the foot-piece, is commanded absolutely. It can be flexed, extended, inverted or everted, rotated in or out, lowered or raised. At the same time extension can be applied to the whole limb by tapes attached to the cross-bar of the foot-piece and fixed in the V of the Thomas. Having got length and alignment in the fractured limb, the cross-bar is fixed by tying to the side bars with tape. This is often the only form of extension which can be applied in fractures of both bones of the leg near the ankle. Care should be taken to thoroughly fix the knee in the splint by means of large cotton-wool pads and a bandage. The whole splint is suspended in a C-model suspension.

One great feature in the wards, and an incalculable blessing to the patients and attendants, has been the wide adoption of the overhead rail for the suspension of limbs, and to take the place also of the pulley arranged over the head of the patient's bed in most hospitals to allow him to lift himself by his arms. This was devised at an early date in Boulogne as a result of seeing patients with fractured thigh put up by the so-called Balkan method by Lieut.-Colonel Miles. It has consequently acquired the name of the Balkan support. Two of them, one placed on either side of the bed, may also be employed for the support of an entire hammock bed.

For fixation of the thigh in the abducted position, the abduction frame of Robert Jones was ready to hand, but in the case of the upper extremity much difficulty was experienced in the earlier part of the campaign until the capability of a short Thomas's knee splint for this purpose was fully appreciated.

Captain Page has adopted the ambulatory method of treatment in some cases of fracture of the thigh and the leg, the former with the aid of lateral extending screws fixed above and below to plaster collars surrounding the thigh, the latter by muslin strips impregnated with plaster-of-Paris, after Delbet's method.[15]

FIG. 3.—Thomas Knee Splint with Plantar Extension (Major Sinclair). A plaster cast is made of the sole of the foot by means of flannel impregnated with plaster-of-Paris. Incorporated in this cast are tapes. When the cast is dry it is glued to the sole of the foot and extension is got by attaching it with the tapes over the serrated border of a special wooden foot-piece.

A great amount of ingenuity has been expended on splints devised to facilitate transport or to meet special emergencies, also on various adjuncts to the splints themselves. Thus many varieties of rubber, metal, or flannel slings to support the limbs in wire splints, extension attachments, forms of glue for fixing extension strips to the limbs, and lastly, the highly efficient counterpoise suspension apparatuses of Major Sinclair (Figs. 2, 3, 4, 5). Space does not allow of more than mention of these many adjuncts to convenience, cleanliness, and the comfort of the patients.

Plaster-of-Paris has on the whole been but little used, and mostly for purposes of transport. The difficulty of keeping plaster splints clean has mainly militated against them.

Lastly, as to the treatment of the wounds. In this place it is assumed that proper cleansing, drainage, and removal of loose fragments and foreign bodies has been carried out at the casualty clearing stations. Under these circumstances no further immediate procedures are needed on the lines of communication. Even in the case of inefficient drainage or extending infection great judgement requires to be exercised in interference on the first arrival of the patient.

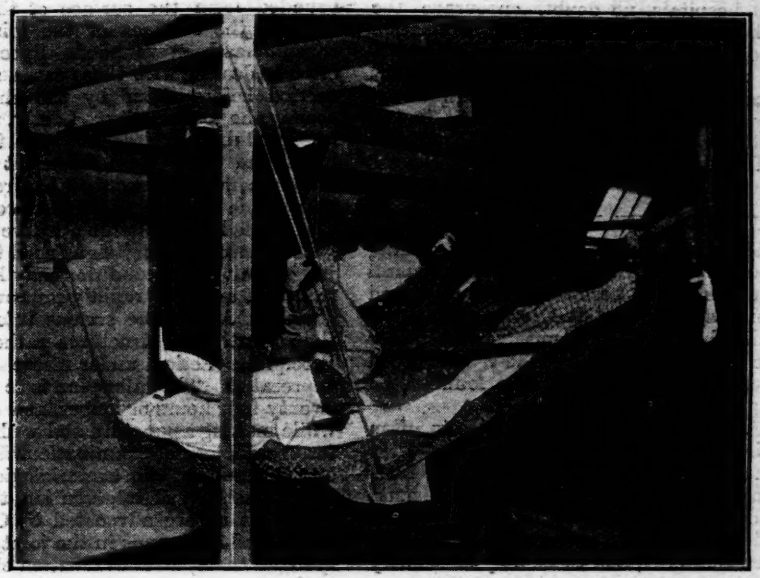

FIG. 4.—The Net Frame used in the Treatment of Fractures of Upper Third of Femur with or without Large Wounds (Major Sinclair). An ingenious combination of the hammock with abduction of the thigh, embodying the principle of Hodgen's thigh splint. A wooden frame 7 ft. by 5 ft. is constructed with a transverse bar, which is at the level of the patient's umbilicus; two leg bars run from the umbilical bar to the foot of the frame. Extensions are applied to both legs by means of gauze and glue. These are passed through holes at the end of the frame and tied. The patient's back and legs are well padded, and the body and legs are supported in the frame by strong one-inch netting. This netting is in three pieces—one for the body, fixed to the sides and head of the frame, and two leg pieces fixed to the leg bars, which are abducted to the necessary angle. Either can be freed independently. The frame is slung by the corners to four uprights (the universal leg suspension frame). Extension is obtained by lowering the head of the frame, usually about 15 inches. This method of treatment is efficient, and the results very satisfactory, both dressing of wounds and nursing of patient being extremely simple.

The object to be aimed at is the secondary closure of the wound at the earliest date practicable, and with this object a continuous antiseptic method should be carried on. Up to the present time the most conspicuous success in this direction has been attained with the Carrel-Dakin method, and if treatment has been commenced at the casualty clearing station, the wound may in a considerable proportion of all cases be closed within a period of three weeks. It may be fairly hoped, in the light of present experience, that the number of chronic suppurating compound fractures will be in the near future largely reduced.

The date at which sequestra should be removed to allow a complete surgical sterilization of the wound has raised some discussion. When the fracture has not been accompanied by sufficient loss of bone for risk of non-union to occur, there can be no doubt that the earliest possible date is desirable. If, on the other hand, little but the periosteum and a few fragments remain, the probability of securing a sufficiently active osteogenesis to effect union is no doubt increased by leaving apparently dead fragments of bone in connexion with the periosteum for some time, because a few bone cells may have escaped to help in repair which will probably perish if exposed in a suppurating wound.

In suppurating fractures of some standing Rutherford Morison's method of secondary closure after introduction of the iodoform, bismuth, and paraffin compound has been imported from England, and is giving good results.

Radical treatment for the condition of chronic osteomyelitis has not often been undertaken, unless the cases are of such a character as to be subjected to amputation; the majority are transferred to England, where prolonged stay in hospital is more readily assured.

Lastly, methods of mechanical fixation by plates and screws or by wiring have been very little resorted to as primary measures. A very large proportion of the cases so treated failed from the septic character of the wound, but in the face of the results more recently obtained by secondary sterilization and closure of the wound it is probable that these methods may be revived in cases of difficulty of maintaining the fragments in position, or at any rate resorted to at a much earlier date under more favourable conditions.

Both in Boulogne and elsewhere special departments have been established for the treatment of fractures alone, and in the hospitals generally an attempt has been made to collect the patients with fractures under the charge of one medical officer. This plan has obvious advantages in ensuring special aptitude on the part of the surgeons concerned and the possibility of attaining general results approaching the ideal. At the same time, its general adoption is impracticable; the cases are of a nature to necessitate a long stay in hospital, their collection in one ward imposes a very heavy task on the nursing staff, which needs to be largely increased, and, finally, it not only removes a source of great interest from the general surgeon, but it also renders him less fit to treat such cases when heavy fighting produces them in such great numbers as to render segregation impossible. It must always be borne in mind that the good military medical officer is a general practitioner, since occasions must always occur with frequency in which he must be prepared to deal efficiently with any kind of casualty. The

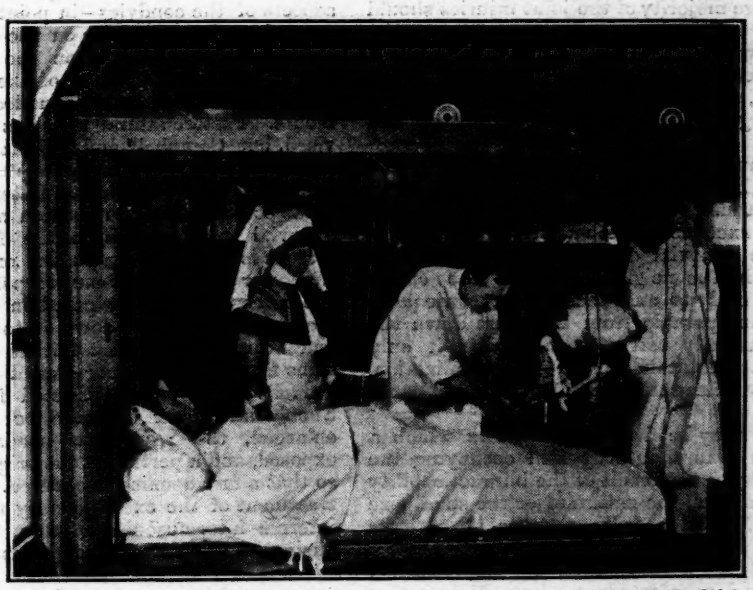

FIG. 5.—Fracture of the Thigh treated with Thomas's Knee-splint and Sinclair's Foot Extension; Counterpoise Suspension from a Travelling Gallery (Sinclair).

only way to carry out usefully this idea is to create one or two special centres in which such cases can be treated as well as possible by specially skilled surgeons, and utilize these as presenting an ideal towards which all should work. Such special hospitals, no doubt, encourage the device of new methods and the perfection or modification of others; our special hospitals have done this, but it is only just to the medical officers generally to say that a number of the most useful devices have been introduced quite independently of special conditions, and it is fair to assume that with young and energetic officers this is always likely to be the case.

WOUNDS OF THE JOINTS.

The experience gained in recent previous wars regarding the treatment of wounds of the joints has proved of small avail in the present campaign, because it was obtained almost entirely from observation of the lesions produced by rifle bullets, which had proved themselves of minor gravity and capable of healing spontaneously with good results when subjected to simple treatment founded on the sovereign principle of rest.

The problem of dealing with grossly infected joints, often enclosing a septic irregular fragment of shell and dirty clothing, perhaps further complicated by extensive fractures of the cancellous articular extremities of the bones, was therefore practically a new one to the surgeons engaged. Some definite facts have emerged from the first flood of difficulties encountered, and these may be shortly summarized as follows:

1. The wound of the soft parts clothing the joint is vastly more difficult to deal with than the articular cavity itself, and demands the most scrupulous care on the part of the surgeon.

2. The synovial capsule itself is capable of dealing unaided with an infection often of a really serious grade.

3. A strong tendency exists for an infection to localize itself, and the remaining portion of the capsule may remain free.

4. Drainage in the sense of the insertion of large tubes left in position for days or more is not only useless but also harmful.

5. That a gunshot wound of a joint cannot be dealt with too early, and with proper treatment forms one of the best subject wounds for primary suture.

6. That following the primary surgical intervention the main principle to be observed is that of complete rest gained by immobilization and extension.

General appreciation of these facts has resulted in the conclusion that a large majority of the joint injuries should be subjected to their chief active surgical procedure in the hospitals of the advanced lines, and hence the general hospitals at the present time receive only cases well upon the road to recovery, or such as present the more difficult problem of dealing with established infection and suppuration.

The line of treatment which has been adopted in the former class of case has been already laid down elsewhere (June 2nd, p. 718); it only remains to add that even cases which eventually do excellently often arrive on the lines of communication with synovial effusion and local redness over the joint and in the neighbourhood of the closed wound, signs due entirely to an exacerbation consequent on the disturbance inseparable from transport down the lines. Such cases usually settle down rapidly if only strict care be taken to maintain complete immobilization, while any premature intervention may be the direct cause of disaster.

The class of case may be first dealt with in which a patient arrives with a foreign body still occupying the joint cavity. This may be the result of the impracticability of early *x*-ray examination, the nature of or the small size of the foreign body, or of a large number of patients having to be rapidly dealt with.

If the foreign body be a rifle bullet, and the condition of the external wound satisfactory, no immediate action beyond fixation of the joint is advisable at this period. It is far safer to leave the bullet *in situ* until all chances of awakening or spreading an infection have passed by. The same attitude of masterly inactivity is to be recommended in instances in which the included foreign body consists of very small fragments of shells or bombs, especially if the bodies lie without the actual confines of the articulating surfaces. Such foreign bodies may never need removal. Thirdly, when fragments of shell are of larger size and need removal they may be found to have rebounded from the surface of the bone and actually lie without the confines of the joint cavity, although the capsule has been wounded. Special care needs to be exercised in dealing with these cases, since portions of clothing carried before them by the shell fragments may still occupy the joint cavity. Lastly, the foreign body may be impacted more or less deeply in the articular end of the bone, and if a shell fragment it should be removed, although in a patient who has recently undergone transport undue haste in the procedure is not advisable.

Wounded joints which arrive with obvious local and general inflammatory signs need to be treated with great judgement. The condition may have been aggravated by transport and may rapidly improve when complete rest is assured. Again, the serious infection may be situated in the periarticular structures rather than in the joint itself. Precipitate action under these circumstances is to be deprecated. The safer plan is to place the limb at rest for twenty-four hours or longer, and observe the result, meanwhile making a puncture and withdrawing fluid, if present, for bacteriological examination. If want of improvement or the result of the bacteriological examination indicate the advisability of intervention, the type operation should be of the nature advocated by Colonel Gray—excision of the wound or wounds in the joint coverings, flushing of the synovial cavity after evacuation of its contents, and suture of the synovial membrane. The treatment of the external wound differs according to its size and condition. In some instances it may be closed completely, in others a drainage tube may be inserted down to the sutured capsule, or, where the wound is extensive or obviously not free from infection, it is better to leave it freely open and treat it by antiseptic measures until surgically sterile and suitable for secondary suture. Naturally some of the more extensive wounds must be left to heal by granulation.

The treatment of a freely suppurating joint requires to be of a different character; here the joint cavity must be maintained open and sterilization effected by an antiseptic method, of which Carrel's has undoubtedly given the best results. When, for instance, the cavity of the knee-joint in general needs to be drained, the method carried out by Captain Campbell and advocated by Captain Gill is worthy of special mention. It is generally agreed by all observers that when suppuration extends backwards from the knee the line of progress is not from the pouches lying on either side of the crucial ligaments but around the lateral aspects of the condyles—in point of fact, by the popliteus extension of the capsule on the outer side and the semimembranosus extension on the inner. Hence posterior drainage from the centre of the joint is not only inconvenient to arrange but also inadequate to meet the requirements. Postero-lateral incisions have therefore been devised, but Campbell and Gill have regularized a method which simplifies greatly the accurate and adequate drainage of these regions. Lateral incisions having been made corresponding in position with the reflection of the synovial membrane from the femur, a pair of artery forceps is pushed down on the outer and inner aspects of the lower end of the femur respectively until the points of the forceps can be palpated in the popliteal space. An incision is then made down on to the guide thus furnished, and a direct route is established to the two bursal extensions from the posterior aspect of the joint, and by this Carrel's tubes are conducted for the requisite depth. Should still freer drainage be required, the incision is enlarged, the respective heads of the gastrocnemius exposed, and a portion of the origins of the muscle excised, so that a free opening is ensured. Further mention of the treatment of the extensions by the subcrureal pouch, the internal intermuscular septum, beneath the popliteus or along the semimembranosus tendon is unnecessary. The upper pouch of the joint may need several instillation tubes, which are gradually decreased in number and totally removed at as early a date as possible.

For suppurating joints of some standing Rutherford Morison's method has been adopted with success.

The influence of a coexisting fracture on the prognosis in a joint injury is a matter of great moment in any class of case, but the frequency with which this condition is

met with in gunshot wounds invests it with a very special degree of importance.

There is little doubt that the actual risks to the safety of the limb attached to this complication were somewhat over-estimated at the commencement of the war, and that to-day, in the presence of a more satisfactory and rational treatment of the wound, and also the knowledge acquired as to the possibility of saving the joint entire, or submitting it to either primary, intermediate, or secondary excision, the prospects of avoiding amputation are much improved.

It may be laid down generally that tunne's, cavities containing missiles, fissures, and even T fractures, do not of necessity entail a very serious prognostic gravity provided the wound in the soft parts can be and is satisfactorily dealt with, and the fragment of shell removed.

In a large proportion of such injuries a more or less movable joint can be attained, and in many a perfect result. Still, in no form of injury does this more depend upon the continuous attention of the surgeon, care in the initial treatment of the joint, and subsequent daily precaution. Injuries affecting both bony elements are more serious, but may be treated by excision. Severely comminuted articular ends commonly need amputation, except where the single articular end can be removed, as in the case of the upper ends of the humerus and femur, or where bones, such as the carpal and tarsal, can be completely removed. The position to-day may be fairly summed up by the remark that, putting on one side articular injuries in which the bony destruction is irreparable, the fate of the case depends upon the success with which the wound of the soft parts surrounding the articulation is treated, the actual joint lesion taking a place of secondary importance.

Excision of Joints for Gunshot Injury.

The operation of excision is certainly struggling for a return to its former position as a procedure in military surgery. The operations were no doubt in older wars often performed for what would now be considered injuries not sufficiently extensive to demand so radical a procedure; further wound treatment was often defective. Yet excision occupied a prominent place until, with the introduction of the bullet of small calibre and ogival or dome-shaped tip, injuries of the joints began to be regarded as of minor importance. A revulsion in the latter opinion occurred early in this campaign, and some surgeons, notably Colonel H. M. W. Gray [16] and Colonel A. Fullerton,[17] have striven to enlarge the sphere of application of the operation. Growing experience has shown that it may be resorted to in well chosen cases in all three stages of the progress of a joint injury, with a distinct prospect of success under suitable conditions.

Early Excision.

By this is meant immediate operation at the casualty clearing station. It is obvious that a certain number of joints may be excised as an alternative to amputation. Thus a severe localized comminution of the lower end of the femur or the upper end of the tibia may render any chance of recovery with a useful limb improbable, while the uninjured shaft may still be of sufficient length to allow of ultimate union. The same remark may apply when both articular surfaces have been destroyed by a traversing missile. In the case of the upper end of the humerus, and also of the femur, comminuted fractures with destruction of the articular surface also form good subjects for the operation. In the case of the elbow a partial excision may often be done. The possibility of these procedures is limited, however, by the definite condition that circumstances will allow the patient to remain a sufficiently long time to be able to bear safely the risks of transport down the lines of communication to the general hospital.

Intermediate Excision.

This operation is that concerning which the gravest doubts were felt in the earlier stages of the war, and even now it can only be undertaken with the definite intention of following it at once by an amputation if the procedure is followed by local extension of infection and signs of systemic absorption. It has, however, proved that excision may be a successful alternative when the severity of the general and local signs seems to indicate amputation as the only resource. The explanation of this experience can be found solely in the facts that better drainage can be ensured when the articular ends of the bones have been removed, and the wound can be treated more effectively. It is a striking fact that progressive osteomyelitis from the sawn ends of the bone has not developed, especially when the frequency of this complication in ill-drained comminuted fractures is remembered. Two special details need mention: (1) Should the synovial membrane be removed? As a general rule this question is to be answered in the negative. The synovial surface in itself is better capable of dealing with an infection than a freshly cut layer of subsynovial areolar tissue; further, when no extensions of suppuration have taken place it forms an effective barrier against such extensions when proper drainage is provided. (2) Should the refreshed ends of the bones be placed in apposition, or be temporarily kept widely separated by extension? The latter plan has been most generally adopted. The excision of bone should be of the most limited extent in the case of the knee. Lastly, in this joint as in all others, excision is not to be regarded as a proper alternative where efficient drainage can be expected to ensure the end desired.

Late Excision.

The principles guiding the performance of excision at a later date do not materially differ from those laid down above; moreover, as far as the hospitals on the lines of communication are concerned, the distinction is rather one of date than of the actual pathological conditions to be dealt with.

The Results Obtained in Wounds of the Knee-joint.

Any writer concerned with wounds of the articulations instinctively thinks of the knee-joint, the most troublesome to treat, and that in which a good result is most gratifying. Two small series of cases treated by Captain Campbell and Captain Gill respectively may give some indication of the results being attained.

In 60 consecutive cases (Campbell) coming from the fighting on the Somme, 14 were classified as very severe, 17 as severe, 13 as slight, and 16 as having retained foreign bodies. Three died and one required amputation. The three deaths were due in two cases to secondary haemorrhage and in one to septicaemia. The other 56 cases were transferred to England in good condition, the great majority with every prospect of good movable joints.

In a second series of 69 cases (Gill), in 31 the injury was inflicted by a bullet, and in all an uninterrupted recovery was obtained by rest alone.

Amongst the remaining 38 cases one died as a result of meningitis following a fracture of the skull, and in four cases, one of which developed delayed tetanus and recovered, amputation was required.

Thus in 129 cases amputation was required in 3.87 per cent., and death occurred in 3.1 per cent.

A much larger series of cases, treated by different surgeons at Rouen, has been analysed by Colonel Gilbert Barling, and the results are shown in the appended table:

Cases of Wound of Knee-joint operated on at Rouen Hospitals in the second half of 1916, excluding all those which were so quiet that nothing was done, and all those submitted to early amputation as conservative measures were inapplicable.

1.	Total cases of injury to knee operated on	845
2.	With bone injury	438
3.	Without bone injury	407
4.	Wound excised and closed	322
5.	Cases with wounds excised and closed requiring further operation	82=25.5%
6.	Wound excised and packed	336
7.	Cases with wounds excised and packed requiring further operation	128=38.4%
8.	Excision of knee	42
9.	Arthrectomy, partial or complete ...	15
10.	Excisions or arthrectomies amputated...	13=22.8%
11.	Deaths after excision or arthrectomy ...	13=22.8%
12.	Amputation without excision	151
13.	Deaths after amputation without excision	49=32.4%
14.	Total amputations	164=19.4%
15.	Total mortality	72= 8.5%

Note.—One hospital with a large number of cases was unable to separate the cases under headings 4 and 6.

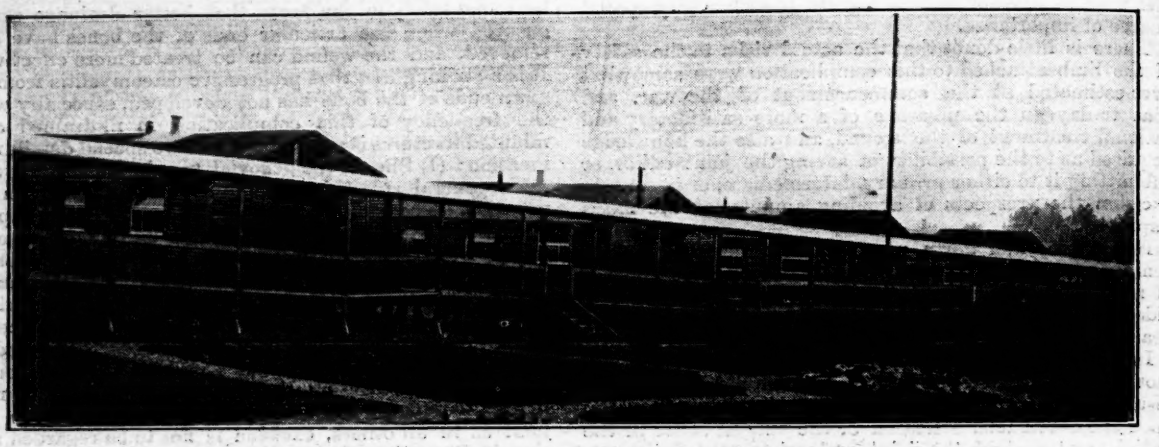

FIG. 6.—View of St. John Ambulance Brigade Hospital, showing connexion of the huts by an open corridor.

INJURIES TO THE HEAD.

A great change has taken place since the commencement of the war both in the nature of the cases and in their actual number. This change depends on the one hand on the fact that a larger number of these injuries are retained and operated upon at the front lines, and on the other on the protection afforded to the head by the helmet. The early treatment of these injuries has already been dealt with; it suffices here to say that the patients which now arrive have either already been operated upon and are in good condition, or they come down already suffering from septic complications. The general lines governing the treatment of the latter class of case have been admirably laid down in a paper in the *British Journal of Surgery* by Sargent and Holmes,[18] and certain points in the technique of the operative procedure elaborated. These authors have also dealt with the anatomical and histological changes associated with traumatic injuries and infected wounds of the brain and their bearing on the surgical treatment of these conditions. Further, examination of a considerable number of patients some months after their return to England proved much more satisfactory than had been generally expected. It was found that the proportion of patients who die after transference to England is small; later complications, such as cerebral abscess, are comparatively rare, and serious sequelae, such as insanity and epilepsy, are much less common than had been foretold. In only 15 per cent. of the patients examined, however, had more than one year elapsed from the date of the injury. It also appeared that many patients with foreign bodies deeply lodged in the brain recover, and are scarcely more liable to serious complications than men in whom the brain has been merely exposed and lacerated. These conclusions are obviously only tentative, but as far as they go appear hopeful.

Holmes and Sargent[19] have also described a condition hitherto rarely seen, and established a definite symptom-syndrome for its recognition. It is characterized by an immediate spastic paralysis of the legs, and frequently associated with spastic paresis of the proximal segments of the upper limbs; they have shown it to be due to occlusion of the superior longitudinal sinus or of the veins that enter it, by a depressed fracture of the vertex of the skull. Experience showed the results of surgical interference with cases of this class to have been extremely unsatisfactory. Thus, among 39 cases observed which were operated upon either by the authors or others, 15 deaths occurred, while among 37 cases in which no operation was undertaken only one died before transference to England. While it is allowed that these figures have no absolute value, as naturally only the most serious cases were selected for operation, and in seven of the fatal cases direct injury to the brain was present in addition, yet the results emphasized the danger of operation. Moreover, the uncomplicated cases showed a remarkable tendency to improve, probably owing to the free venous anastomosis permitting a re establishment of the circulation.

An important contribution to the localization of function in the brain has been published by Lister and Holmes,[20] who from a study of a large number of cases with injury in the occipital region were able to determine the relative positions in the cortical visual areas of the foci that subserve vision of separate portions of the visual fields. They bring forward strong evidence with regard to the site for the centre for macular or direct central vision, of which very little had been previously known.

The following conclusions are come to:

1. The upper half of each retina is represented in the dorsal, and the lower in the ventral, part of each visual area.
2. The centre for macular or central vision lies in the posterior extremities of the visual areas, probably on the margins and the lateral surfaces of the occipital poles.
3. That portion of each upper quadrant of the retina in the immediate neighbourhood of, and including the adjacent part of, the fovea centralis is represented in the upper and posterior part of the visual area in the hemisphere of the same side, and vice versa.
4. The centre for vision subserved by the periphery of the retinae is probably situated in the anterior end of the visual area, and the serial concentric zones of the retina from the macula to the periphery are probably represented in this order from behind forwards in the visual area.

Holmes and Smith have recorded observations on the nature and localization of motor apraxia, or the inability to perform purposeful actions despite the preservation of movement and power, and in disturbance of the faculty of localizing objects in the external world by vision.

Probably in no other branch of medicine have so many and such difficult problems arisen as in the treatment of wounds and diseases of the nervous system. Further, in this field an extraordinary opportunity has occurred to observe, analyse, and record the effects of local lesions, many of which are rarely, if ever, seen in civil life. When the results of this work are eventually correlated, they must throw much light on the physiology and the symptoms of disturbance of different parts of the brain, spinal cord, and peripheral nerves, and thus increase our knowledge of the diagnosis and treatment of nervous diseases. Special arrangements have been made in order that cases under early observation in France should be sent to special hospitals in England, so that continuous records will be maintained of a very large number of patients.

NOTE BY COLONEL PERCY SARGENT.

I am indebted to Colonel Sargent for the following summary of his opinions:

The very large experience gained of gunshot wounds of the head has led to a considerable degree of modification in their treatment. Immediate routine operation, often incomplete and, in the absence of full neurological information and *x*-ray examination, sometimes unnecessary and even misdirected, is no longer widely practised. It has long since been made abundantly clear that early evacuation of operated cases is often followed by disaster. As it is impossible to operate upon these cases and to retain them at the clearing stations for a period which renders transportation safe, more especially during times of great military activity, the practice now generally adopted is to transfer them without operation as soon as possible to hospitals further down the line. It has been made quite

clear that surgical intervention is rarely required for the relief of cerebral symptoms, whether general or focal. Its chief aim is the prevention of intradural infection. On this conception all cases of gunshot wounds of the head fall into one of two categories, according to whether the dura mater has or has not been penetrated. Non-penetrating wounds have a low rate of mortality, whether operated upon or not, provided that the surgeon respects the integrity of the dura mater.

It is customary, therefore, to do in these cases only as much as may seem advisable to ensure speedy healing, such as excision of the edges of the wound, removal where necessary of bony fragments, and partial or complete closure of the gap in the scalp either by suture or by some form of plastic operation.

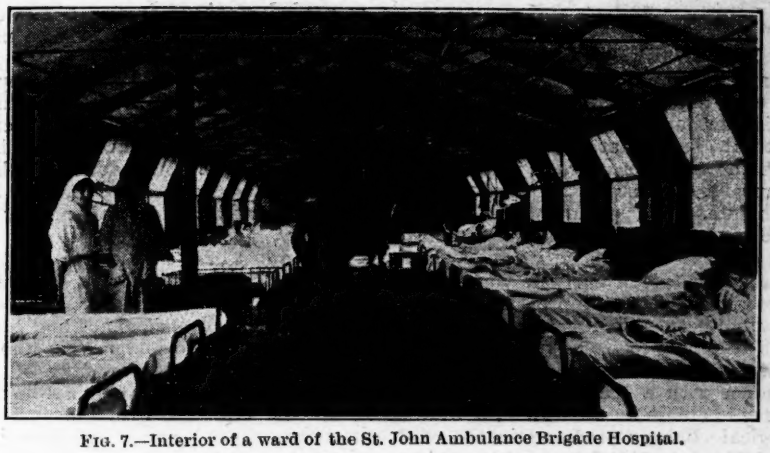

FIG. 7.—Interior of a ward of the St. John Ambulance Brigade Hospital.

Penetrating wounds, on the other hand, afford more room for difference of opinion regarding their treatment. Individual cases continue to present difficulties even to those who have seen large numbers, but, broadly speaking, there is a consensus of opinion in favour of the following line of treatment: The wounds having been cleansed and dressed, the patient is transferred as soon as possible to a hospital where he can be retained for at least a fortnight after the operation. A complete neurological and radiographic examination is made and the operative treatment then directed according to the diagnosis thus arrived at. In some cases of penetrating wounds no operation is indicated, such as those in which a bullet has passed completely through the head; or those in which a bullet or a metallic fragment is embedded in the brain at a distance from a small clean entrance wound, and is giving rise to no symptoms. Another class of case for which operative interference is usually contra-indicated is that in which the longitudinal sinus has been injured. Cases where a track from the scalp wound leads down to indriven bony fragments, or to an easily accessible missile are operated upon, briefly, as follows: A moderately large flap is turned down after resection of all damaged tissue round the scalp wound; the bony opening is enlarged sufficiently to expose thoroughly the opening in the dura mater; the indriven fragments of bone and metal are removed under a constant stream of hot physiological saline solution; and the track is drained by a celluloid, metal, or rubber tube brought out through the original wound. In cases of more superficial cerebral laceration, where track drainage is unnecessary, the principle is employed of covering the denuded brain by some plastic operation on the scalp; in these circumstances drainage tubes emerging from the angles of the scalp flap are usually employed for a few days.

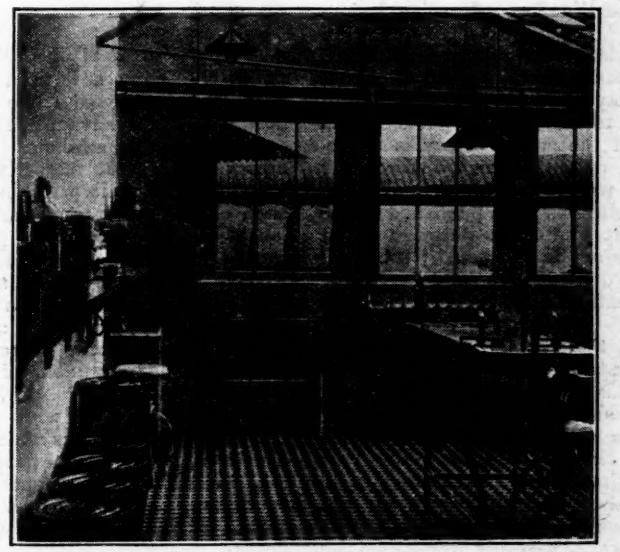

FIG. 8.—Interior of the operating theatre of the St. John Ambulance Brigade Hospital.

Retained Missiles.

Opinions still vary regarding the advisability of operating for the removal of bullets or shell fragments. There is much evidence to show that these foreign bodies are well retained, and, apart from the uncommon accident of late suppuration, cause no symptoms. It has been stated by more than one writer that bullets embedded in the brain move about under the influence of gravity. The evidence for this view is wholly unconvincing. Removal of bullets, even when the wounds have healed and the risk of septic infection thereby is largely minimized, must be, even in skilled hands, attended by an amount of damage which in most cases would have more serious neurological consequences than could the presence of an aseptic bullet.

Primary removal of a deeply-seated missile carries with it the additional risk of septic infection. For these reasons the usual practice is to leave alone such missiles.

The treatment of indriven fragments of bone is more debateable. When driven into the brain by a missile which is itself retained, the bony fragments are rarely, if ever, more deeply placed than the projectile. When driven in by the impact of a missile which does not itself enter the cranial cavity, the bony fragments are rarely found so deeply situated but that they can be removed along the track with little, if any, additional damage being done.

With regard to the septicity of these indriven metallic and bony fragments, it has been found that a large proportion, when dropped into culture media immediately upon removal, fail to provoke any bacterial growth, either aërobically or anaërobically.

The question of the intracranial pressure has been the subject of repeated observation. Among the conclusions of practical importance which have been arrived at are the following:

1. Apart from the rare instances of extensive intracranial haemorrhage, traumatic oedema, whilst playing an important part in symptomatology, does not reach a sufficient degree of intensity to endanger life.

2. The instances of severe intracranial haemorrhage not rapidly fatal are very few; and even amongst these there is a certain number which surgical intervention is not likely to save. Experience has shown that an intracranial haemorrhage which is sufficiently severe to demand operative relief, and which can be recovered from, gives unmistakable signs of its progress. The operation can be deliberately planned and carried out with the definite object in view. Exploratory operations on the chance of discovering a haemorrhage are rarely if ever called for.

3. In case of intracranial pressure from secondary oedema which is causing severe headache and herniation of brain, this can almost always be controlled by lumbar puncture. Occasionally contralateral decompression has been done for these cases and has afforded good results.

Such evidence as is at present available from the later results (six months to two years) is all in support of the general policy of treatment outlined above.

The steel helmets have played an important part. The study of cranial wounds before and after their general adoption brings to light many interesting points. The outstanding feature, however, is that which concerns the penetration of the dura mater. The proportion of penetrating wounds has very largely diminished, as also has the mortality, another amongst many indications that the surgeon cannot attach too much importance to the integrity of this membrane, or treat it with too much respect.

INJURIES TO THE SPINAL CORD.

Wounds and injuries of the spinal cord, when amenable to treatment, demand early surgical intervention. At the commencement of this war but little was known regarding the actual structural changes attendant on gunshot injuries, and what was known was concerned mainly with the changes which were found in spinal cords examined at a comparatively late date. The position of the surgeon was rendered yet the more difficult, in that past clinical experience had shown the extreme difficulty which exists in forming a correct prognosis, particularly in view of the remarkable ultimate recoveries observed in patients whose primary symptoms had not been able to be distinguished from those observed as attending total destructive lesions.

In order, therefore, to recognize when surgical intervention can be undertaken with a reasonable prospect of success, it was necessary to obtain an accurate idea of the nature of the pathological changes produced in the cord by modern projectiles. An investigation on this subject was undertaken by Gordon Holmes.[21] He found that even slight local injuries are very frequently associated with extensive oedema, haemorrhages, softenings, and often with ascending cavity formation, which may extend a considerable distance both above and below the level of the original injury or wound. These changes he refers to the concussion effect produced by the missile through the walls of the spinal canal; they may exist even without the presence of a fracture of the vertebrae. Such changes can obviously not be relieved by any reasonable operation, and the fact that, apart from the secondary cavities that develop later, they occur immediately or within a very short time of the infliction of the injury, diminishes the favourable prospect of any surgical intervention. In some cases undoubtedly the symptoms are largely or in part due to compression of the spinal cord by either the missile or a fragment of depressed bone, but numerous examinations have proved that even in these the same intraspinal lesions exist.

Even relatively slight injuries often produce for the first few days, the period when operation offers the best chance of success, symptoms that may be confused with those of total and irreparable damage to the cord, and some clinical indication of the severity of the spinal injury is consequently necessary before an operation can be reasonably undertaken. This question was investigated in a large number of cases and the conclusions were published in the same lectures. These are to the effect that the safest guide to the severity of the injury is afforded by the form and character of the sensory disturbances, and especially by the changes and modifications in the reflexes of the affected limbs.

In most cases the site of the wound or a radiographic examination permits an accurate diagnosis of the medullary lesion, but not infrequently this can be determined only by a study of the symptoms produced by it. The method by which an accurate local diagnosis can be made is also dealt with in these lectures. Here, too, many important and interesting symptoms which result from injuries to different portions of the spinal cord are described. It was found, for example, that when its lower cervical and the upper thoracic segments were severely affected, the patients often presented a serious symptom-syndrome characterized by hypothermia, bradycardia, low blood pressure, reduced secretion of urine, and mental hebetude. The body temperature may fall as low as 80° F. (27° C.), the pulse-rate to 35 or 40 per minute, the blood pressure to 60 mm. of mercury, and only 4 to 8 oz. of urine may be secreted in the twenty-four hours.

Injuries to the region from which the vasomotor fibres to the kidneys pass off may, on the other hand, produce an extraordinary polyuria, and lesions in the higher cervical segments were shown to be often associated with hyperpyrexia.

Attention has been drawn by T. R. Elliott[22] to the occurrence of spinal lesions in men who have been exposed to shell explosions in their immediate vicinity, but who escaped direct injuries.

The acquisition of wider knowledge has not, however, greatly widened the scope of operative intervention. Operations are still for the most part confined (1) to cases in which a radiographic or direct examination reveals the presence of displaced and depressed fragments of bone or the lodgement of foreign bodies either within the canal or buried in the cord (it may be mentioned that several cases have been observed where retained bullets have travelled long distances within the spinal canal, particularly in its lower part); (2) to cases in which the patients suffer severe and unbearable pain; (3) to cases in which pressure from haemorrhage around the cord is suspected, such cases being very rare. An additional class may be added in which a late operation is performed on the chance of some improvement being gained, mainly as a question of expediency. Patients with injuries to the nerves of the cauda equina have as a rule been evacuated to England.

No striking change in operative technique has been developed, beyond the general tendency to partial rather than classical laminectomies, and perhaps the development of an increased confidence in the utility of placing a muscle graft over the opening in the spinal membranes when leakage of cerebro-spinal fluid has been associated with the performance of the operation. An intact dura has throughout been an important immediate prognostic element, as in the case of injuries to the head.

Early drainage of the bladder by a suprapubic tube has been advocated by Percy Sargent since the commencement of the campaign, but the difficulties in the transport of patients thus operated upon, and the increased responsibility devolving on the nurse in keeping the back in good condition, have militated against an extensive adoption of this measure.

Injuries to the peripheral nerves have been extremely common; it has indeed been estimated that in 18 to 20 per cent. of all limb wounds slight or more serious lesions of the large nerve trunks coexist. But owing to the facts that when, as is usually the case, extensive septic wounds are present, the early surgical treatment of nerve injuries is impracticable, and that the patients with small and clean wounds can be safely transferred to England, neither the treatment nor the study of these injuries has been an urgent question in the general hospitals on the lines of communication in France.

ABDOMINAL INJURIES.

The chief interest in injuries to the abdomen has rightly been transferred from the general hospitals to special hospitals at an advanced line or to the highly developed casualty clearing stations. Prior to the summer of 1915, however, the great majority of injuries to the abdominal viscera were dealt with on the expectant system, and such of the patients as survived arrived in the general hospitals. The experience gained from the observation of these afforded some information regarding the prognosis of wounds of both hollow and solid viscera, which may in the future not be so readily obtained.

The enormous mortality attending injuries to the small intestine was clearly demonstrated, both by the comparatively small number of patients arriving, and by the simple nature of the injuries found at *post-mortem* examination compared with the extensive and multiple character of the lesions which have been almost uniformly discovered by early operations. This experience exerted a healthy influence in supporting the advisability of early operation. The lesser fatality attending wounds of the colon, excluding the transverse colon and the sigmoid flexure, was also clearly brought out, since a larger proportion of wounds of the large gut arrived at the general hospitals, and of these more than 50 per cent. recovered sufficiently to be transferred to England in good condition. This number obviously has no bearing on the actual mortality of wounds of the colon, but compared with a percentage recovery of less than 16 per cent. in a small series of minor injuries to the small intestine, it is sufficiently striking.

A few points of some interest also emerged from the series of *post-mortem* examinations made on patients who had survived several days; thus the general character of the peritonitis in cases of wounds of the small intestine,

and the localized nature of that developing in consequence of wounds of the large intestine; the observation that when the wound track traversed the psoas muscle and its sheath, extravasation of faecal contents extended to the thigh, and, indeed, might travel the whole length of the lower limb; that, while patients dying from the effects of wounds of the small intestine uniformly succumbed to peritoneal infection, deaths following wounds of the colon were, in 40 per cent. of all the cases, the result of a general infection from the septic wound of the soft parts of the trunk, and not from the peritoneum itself, the main feature of the general infection being a purulent bronchitis; lastly, in a series of *post-mortem* examinations made by Captain Henry, in every case a general *post-mortem* invasion of the blood stream by anaërobic organisms was discovered.

Experience again proved the practical futility of performing operations for the closure of intestinal wounds after thirty-six hours has elapsed from the time of injury, and it is probable that any successes obtained in this field can be counted upon the fingers. On the other hand, the good results often obtained by performing a proximal colostomy in large wounds involving the colon, and thus preventing the occurrence of the late systemic infection referred to above, have been amply proved. The few cases in which an attempt has been made to obtain the same result by making an intestinal short circuit by anastomosis have not been encouraging, and it is obvious that this class of case is not a favourable one for such procedure, both by reason of the general condition of the patient and the difficulty in performing a clean operation.

No novel features have been disclosed by observation of the numerous instances of wounds to the solid abdominal viscera, except that perhaps more attention has been given to interference with their secretory activity, and that the favourable course commonly following these injuries in the absence of serious septic complications has tended to confirm the propriety of maintaining an expectant attitude in the question of surgical intervention. Speaking generally, it may be said that the formation of an abscess or the occurrence of secondary haemorrhage are the only indications for interference at the period at which the patients reach the general hospitals. Septic infection has been the common cause of death in all cases of fatal injury to the solid viscera, and in 40 per cent. of deaths from wounds of the liver secondary haemorrhage has accounted for the fatal issue.

Intraperitoneal injuries to the urinary bladder, even discovered during operation, have been rare throughout the campaign, and for some reason probably connected with the conditions of trench warfare extraperitoneal wounds have become far less often seen than in the earlier stages of the war. These latter cases were the source of much interest because they were sometimes difficult to diagnose from injury to the pelvic small intestine in the early stage, and also because treatment by simple suprapubic cystostomy was found so successful. Of thirty such consecutive operations only two proved unsuccessful, and in each of these comminuted fractures of the pelvis were coexistent. If treated expectantly, in many instances the urine escaped freely from apertures in the abdominal wall, the buttock, or the thigh for a week or ten days, and the patients appeared to be doing well, when infection of the urine took place, extended to the bladder, and toxaemia followed. Even in the latter class of case, however, a late operation may save the patient.

The condition of cases arriving at the general hospitals subsequently to the primary operations at the advanced lines deserves a word of mention, although the patients are for the most part birds of passage.

The general results have been remarkably good, the most common defect, now not so common as in the earlier stages of the adoption of early operation, has been incomplete union of the wound in the abdominal wall. In some cases this has been accounted for by a primary use of the initial entry or exit aperture for the site of the exploratory incision, in others from the persistency of a gap left for a drainage tube; but beyond these complicating factors an obvious difficulty has been experienced in obtaining firm primary union. In some cases this may have depended on an actual deficiency in vitality of the patient, but in the majority it has undoubtedly been due to infection, and when it is borne in mind that these operations are performed on the subjects of intestinal perforations in whom infected blood is present and has to be evacuated from the abdominal cavity, it is not to be surprised at. Such wounds have usually healed readily by granulation. The next occasional trouble has been the secondary formation of abscesses or fistulae. These have not been common, the abscesses usually following colic wounds and the fistulae wounds of the small intestine. It is noteworthy that fistulae have formed secondarily in several cases in which the primary exploration has been negative—a fact bearing on the common occurrence of severe contusion of the wall of the intestine unaccompanied by perforation. As a rule, the bowels have acted regularly and well; in some instances diarrhoea has been troublesome, and the writer has only seen one patient in whom secondary obstruction was caused by adhesions. On the whole, the evidence seems against troublesome peritoneal adhesions developing with any degree of frequency. In one *post-mortem* examination made upon a patient who died from pneumonia the abdominal cavity was absolutely free from adhesions, and an end-to-end anastomosis was so perfect as to be with difficulty discovered. As is usually the case, however, the bowel on the proximal side of the line of union was already somewhat dilated.

RADIOGRAPHY.*

Considerable advance in the localization of foreign bodies has been made in the general hospitals on the lines of communication during the progress of the campaign.

While the majority of surgeons are agreed that the greatest radiographic assistance which they receive in the removal of foreign bodies is afforded either by stereoscopic

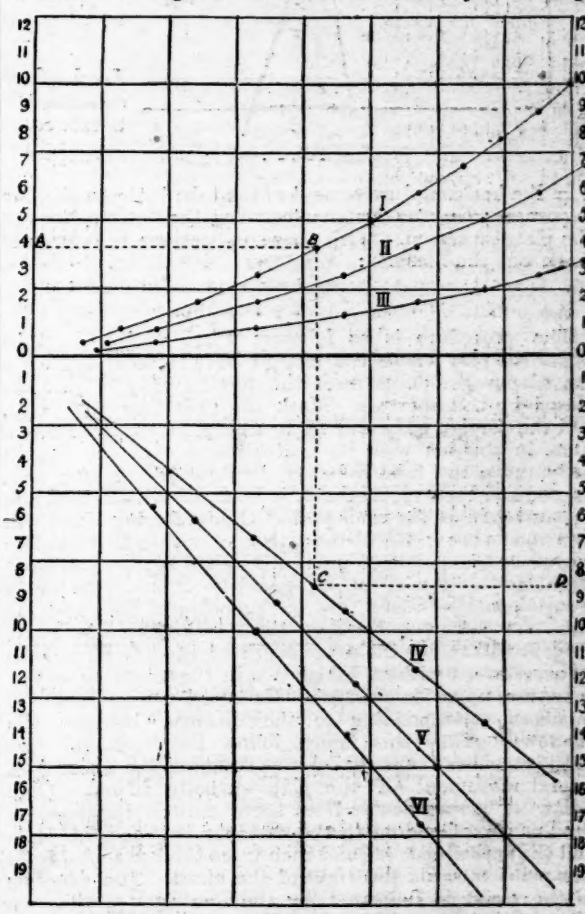

FIG. 9.—I, Curve for a displacement of the focus of 150 mm. II, Curve for a displacement of the focus of 100 mm. III, Curve for a displacement of the focus of 50 mm. IV, Correction for a distance from the screen to the focus of 400 mm. V, Correction for a distance from the screen to the focus of 500 mm. VI, Correction for a distance from the screen to the focus of 600 mm.

skiagrams, or else by two plates taken at planes at right angles to one another—usually antero-posterior and lateral—there are situations in the body, such as the thorax, abdomen, and hip region, where it is more convenient to be provided with the depth of the foreign body in centimetres under a certain spot.

* The writer is indebted to Major Curtis Webb for the technical details contained in this section.

The prime credit of evolving a method for estimating the position of a foreign body must be accorded to Mackenzie Davidson, but in the early days of the war Dr. Hampson worked out a modification of Davidson's principle whereby the depth of the foreign body from the screen or plate could be easily and quickly determined, and several ingenious modifications of a mechanical device attached to a fluorescent screen have been put upon the market based in principle on Hampson's work.

In October, 1914, M. Paul Wiguy, director of the Rouen Electric Light Company, worked out a formula and chart (Fig. 9) for Major Curtis Webb; subsequently the formula was independently evolved, and published in England in 1915. This formula is based on Hampson's principle, and has been extensively utilized by Major Curtis Webb, who has supplied the following details as to its application:

In Figure 10 T is the table, and P the part of the patient in which lies the foreign body at an unknown depth (x); L = the distance between the anticathode and plate;

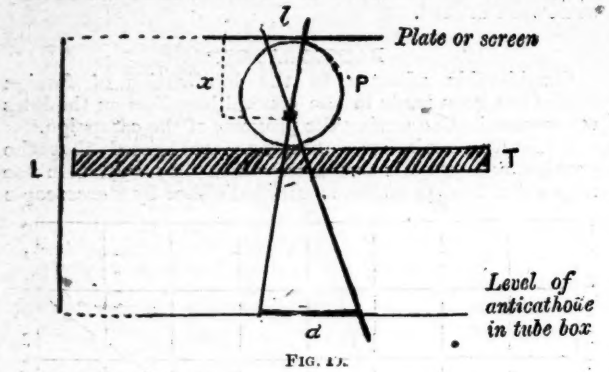

FIG. 10.

d = the horizontal movement of the tube between the two exposures; l = the distance between the two shadows on the plate or screen. With these indications it is easy to work out the formula:

$$x = \frac{l \times L}{d + l}$$

The procedure is as follows: First centre the tube under the part where the foreign body is seen, and close the diaphragm down until the foreign body is just enclosed by the aperture. Mark the skin over the point, and the foreign body will lie vertically under it. Place a plate in position with its centre about over the foreign body, move the tube a few centimetres (4 or 5) one way, expose and then move the tube back 10 centimetres, and expose again *on the same plate*. On developing, there will be two shadows: the distance in centimetres between two corresponding points of the shadows will be the distance l; d should be 10 cm., and L should be 50 cm. On many x-ray couches there are arrangements for securing this last factor, and where this is the case the chart (Fig. 9) will enable the exact depth of the foreign body to be ascertained without calculation in the following way:

In the upper left side of the chart are a series of numbers corresponding to the distance between the shadows. Take this figure, follow the horizontal line until it touches the curve corresponding to the amount of lateral movement of the plate—usually 10 cm. Then follow the perpendicular from there until it impinges on the line corresponding to the distance between the plate and the anticathode (L), and then trace the horizontal from this point towards the right of the chart. The example in the chart is indicated by the line A B C D, where a distance between shadows of 4 cm., a movement of the tube of 15 cm., and 40 cm. between plate and anticathode corresponds to a depth of the foreign body of 8.5 cm.

If a couch has been extemporized the distance of the anticathode from the top of the couch can be measured once and for all and noted, and the distance of the plate, where lying on the part under examination, from the top of the table can be added to the above known distance and the depth of the foreign body finally worked out from the formula; or the part can be raised on pillows until L is approximately 50 cm. From a surgical point of view approximation is all that is necessary, for note that, if it be endeavoured to arrange that L be 50 cm., but for some reason it be either 48 or 52 cm., then x will be either 8 or 8¾. Should, for example, l be taken as 2 cm., then a difference of ¾ cm. is negligible in an ordinary removal of a foreign body. However, very little ingenuity is required to ensure L being fairly accurately 50 cm.

For localization of foreign bodies in the eye, an excellent head rest has been devised by Major Higham Cooper, which is both simple, rapid, accurate, and convenient.

In civil practice it has been customary to radiograph the eye with the patient in the sitting position. This is impracticable in the majority of wounded soldiers,

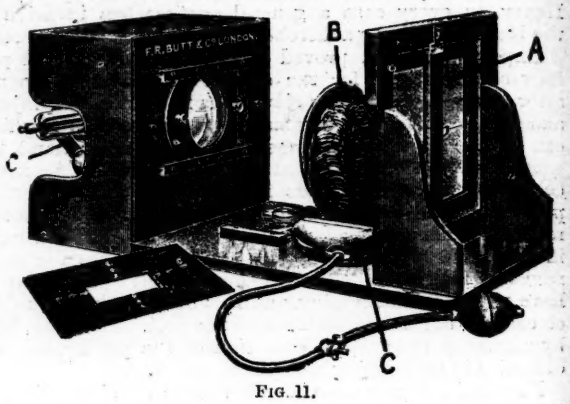

FIG. 11.

hence the head rest, illustrated in Fig. 11, was designed to enable men to be x-rayed while in bed in the wards.

The apparatus is either arranged across the bed, or made to replace the pillow, the patient's head being placed in the position shown in Fig. 11, pressed against a plate-holder A, provided with cross wires. The patient's head rests upon an air pillow, which can be inflated to raise it to the height desired. An upright of thin wood, B, is then pushed up to the other side of the head, and clamped to immobilize the head. The x-ray tube (previously centred on the intersection of the cross wires on the plate-holder) is held in a clamp, c, capable of a 3 cm. shift to either side of the central position against stops. Hence no measurements require to be made, as both the distance of the tube and the displacements are fixed.

In localizing foreign bodies in the eye a metal marker must be placed in some known relation to the centre of the cornea. In head injuries the markers may be placed as desired. Localization is done by the graphic method for vertical and horizontal position, and the usual formula is employed to calculate depth. The negatives possess also the advantage of being stereoscopic.

For working out the *exact* position from a pair of stereoscopic plates a most excellent and accurate method has

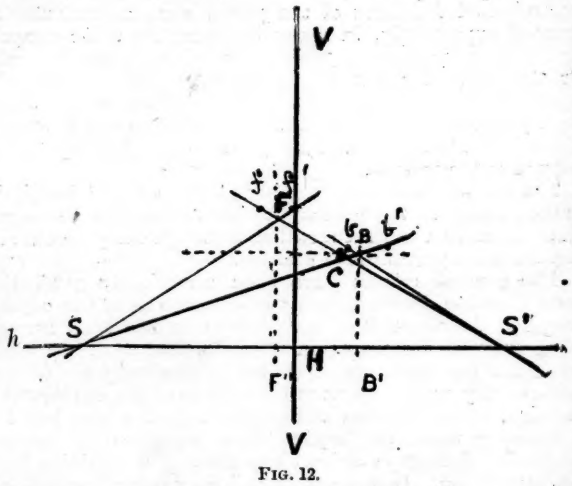

FIG. 12.

recently been published which dispenses with the Mackenzie Davidson localizer.

A typical case will make this clear (Fig. 12). In this case the tip of the fuse wire was exactly 9 mm. under and on the same plane as the centre of the pupil when the

Name..... *Date*.....

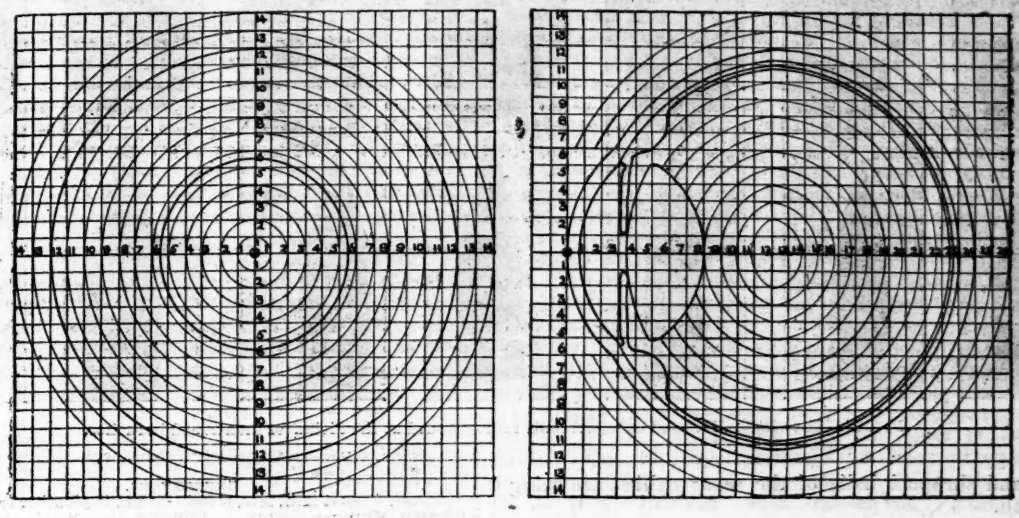

FIG. 13.—Plot out the foreign body on the left diagram, and read off its distance in mm. from the Central Corneal Axis (C.C.A.). Imagine the right diagram rotated round the line of the C.C.A. to the plane passing through the foreign body. The number of mm. the foreign body is from the C.C.A. is counted in the plane tangential to the centre of the anterior surface of the cornea, and the foreign body is plotted out at the appropriate depth. It will be seen whether the foreign body is inside or outside the globe, and how many mm. it is internal or external to the outer surface of the sclerotic.

The foreign body is .....mm. { above / below } the central corneal axis.

.....mm. to the { nasal / temporal } side of the central corneal axis.

.....mm. deep to the plane tangential to the centre of the anterior surface of the cornea.

The charts show the foreign body to be { inside / outside } the globe.....mm. { internal / external } to the outer surface of the sclerotic.

patient looked at some distant object with the sound eye, the patient lying on his back so that the horizontal line *h h* may be considered as passing from the vertex towards the chin. Obviously, then, the vertical line, V V, will be parallel to the central corneal axis (C.C.A.).

Now, on either side of the point of intersection H measure two distances, H S, H S', each of 3 cm., then the points S and S' will correspond to the respective positions of the anticathode of the tubes at the two exposures, and *f* and *f'* the shadows of the tip of the fuse wire, and *b* and *b'* the shadows of the foreign body, and F and B will be the respective true positions of the tip of the fuse wire and of the foreign body. From F and B drop two verticals F F' and B B'; measure F F' and B B', then F F' minus B B' will be the depth of the foreign body. Again, draw a horizontal line through B parallel to *h h*, and as it is known that F was 9 mm. below the central corneal axis, then the centre of the pupil is indicated by the point C; then the distance C B will be the distance of the foreign body *above* or *below* (in this case above) C.C.A. Finally, knowing the distance of the anticathode from the plate, we can determine the distance of the tip of the fuse wire F from the plate—using the formula

$$x = \frac{b \times L}{d + l}$$

—by the distance between the shadows *f* and *f'*, and in the same way the distance of B from the plate can be estimated. If the distance of F be greater than the distance of B from the plate, B is that much on the temporal side of the C.C.A., as is indicated by the difference between the two distances. On the other hand, if B is further from the plate than F, then the foreign body will be that much to the *nasal* side. In the case typified the exact position of the foreign body was

4 mm. deep to
3 mm. above } C.C.A.
exactly on vertical
∴ in globe.

The accompanying charts (Fig. 13) have been suggested by Colonel Lister for demonstrating the position of foreign bodies in the eye, on the lines laid down by Captain J. Herbert Fisher, F.R.C.S., R.A.M.C., in his article in the *Ophthalmic Review*.

EMPLOYMENT OF RADIOSCOPY.

It would appear expedient specially to emphasize the danger of substituting radioscopy for radiography in the localization of foreign bodies except in occasional cases. When a number of cases require attention, radioscopy is undoubtedly the more expeditious, but more than one operator in France has had his face and hands severely burnt by excessive use of the screen. Further, the radiographic plate, even though the structures have a double contour, can afford very definite assistance to the surgeon at the time of operation.

The removal of foreign bodies under the fluorescent screen has been employed to a considerable extent in some hospitals, the following method and precautions being adopted:

The patient is laid on the *x*-ray couch and anaesthetized. The part to be examined is cleansed and covered with a sterile towel, upon which the fluorescent screen is placed. The current being turned on, the diaphragm on the tube box beneath the table is reduced in diameter enough to define the foreign body clearly, which procedure also cuts off all unnecessary rays, and so saves the operator's hands. By pressing on the skin in the neighbourhood of the foreign body and noting its maximum movement it is easy to ascertain at what point the foreign body is nearest to the surface, and it can then be determined whether it should be removed through the original track or whether a fresh incision should be made directly over it. Whichever proceeding be decided upon, the point of a forceps is now introduced and pushed on until it reaches the foreign body. By moving the points up and down alternately it can be noted which movement causes the greatest displacement of the foreign body, and thus it is known whether the forceps occupy a plane above or below it. A little practice enables the forceps to be brought quickly into contact with the foreign body, when they are opened just sufficiently widely to allow it to be grasped without the inclusion of muscle or other structures surrounding it.

As an extra precaution it is well to place a sheet of aluminium 1 mm. in thickness over the diaphragm in order to cut off the soft rays.

RAPID LOCALIZATION OF BULLETS OR SHRAPNEL BALLS FROM A SINGLE RADIOGRAPH ON A SINGLE PLATE.

This method, devised by Captain Pirie, C.A.M.S.,[23] is obviously limited in application, since it assumes that only

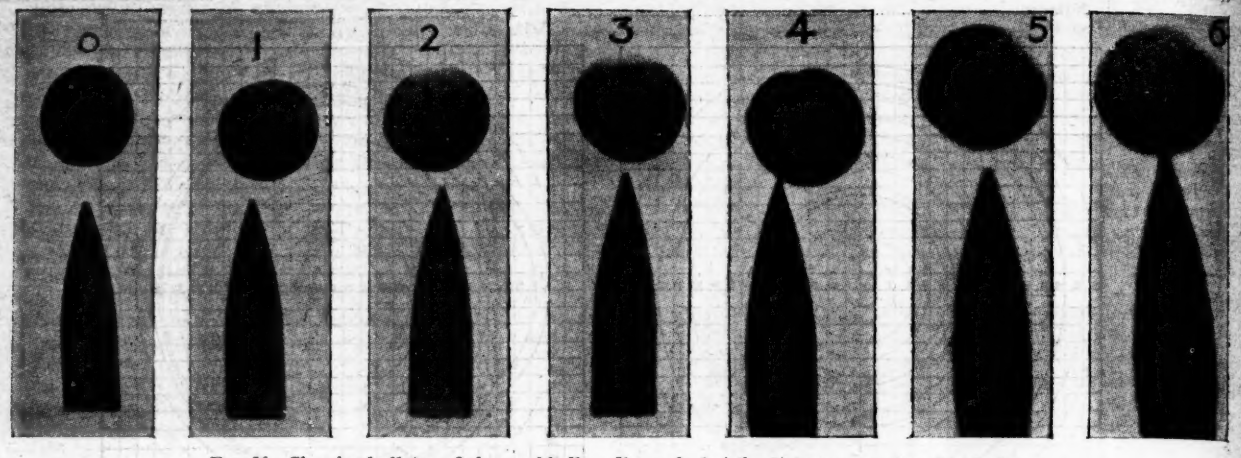

FIG. 14.—Showing bullets and shrapnel balls radiographed at the distances mentioned in inches.

bullets and shrapnel balls of the same calibre are being dealt with.

A key radiographic table is prepared by making radiographs of the bullet or shrapnel ball at the following distances from the plate: 0, 1, 2, 3, 4, 5, 6 in. (Fig. 14.)

The diameter of the bullet or ball casts a shadow the width of which is proportional to its distance from the plate, no matter at what angle the missile may be lying. The length of the bullet forms no guide.

A measurement of the uniformly cylindrical portion of the bullet is made with a fine pair of dividers; the latter are then transferred to the key plate and compared with the shadows; the shadow which they fit exactly, decides the depth of the bullet. The same method applies to the shrapnel ball, provided it is not more than very slightly deformed.

ANATOMICAL LOCALIZATION OF A METALLIC FOREIGN BODY AND RECONSTRUCTION OF ITS TRACK.

Captain Crymble[24] has shown the practical possibility of combining radiographic results with the information which can be obtained from a study of sectional anatomy. By this combination the actual anatomical position of a foreign body can be determined in addition to its depth from the surface or relation to neighbouring bony points. To attain this object he has employed a series of original coronal and horizontal sections of the body, and also the atlas of cross section anatomy of Eycleshymer and Shoemaker. By marking the vertical and lateral positions of the foreign body on a reconstruction of the part of the body concerned, obtained by replacing the sections in position, the sections corresponding to the position of the missile and the track leading thereto are selected.

Application of the depth measurement from the surface, or observation of the relation of the bone to the surface of the section of the body actually occupied by the missile, then allows the definite anatomical structure enclosing the foreign body to be determined.

The structures involved throughout the entire length of the track may also be worked out by the employment of a reconstruction viewed from the anterior aspect, and another viewed from the lateral aspect. On these the positions of the entry wound and of the foreign body are marked respectively. If no bone lesion is present the positions of the entry wound and of the foreign body are connected by a straight line. Where a bone lesion is present the line is carried from the wound to the bone lesion by a straight line, and from this point a second straight line connects the position of the bone lesion with that of the foreign body. Reference to the anterior reconstruction will then give the lateral position of the track in any section, and reference to the lateral reconstruction will give the sagittal or antero-posterior position in any section.

Crymble points out that the method is seldom needed in dealing with the limbs, but it is more useful in regions like the hip or the great body cavities. Further, anatomical localization both of the track and the missile is of extreme importance in prognosis and treatment in injuries to the head, and also affords a valuable means of studying the functions of the brain.

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ON SOME ANAËROBES FOUND IN WOUNDS AND THEIR MODE OF ACTION IN THE TISSUES.

BY

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THE literature on the anaërobes is beset with so many contradictory statements that it is impossible to construct from it an accurate account of the reactions of even the better known organisms. Experience has shown that this confusion is due almost entirely to the investigation of impure cultures, for, with the establishment of a more exact and rigorous technique, the features of individual species are found to become more clearly defined, and previously existing discrepancies tend to disappear altogether.

A CLASSIFICATION OF ANAËROBES.

All the anaërobes isolated from wounds are probably faecal in origin. They give vigorous fermentation reactions in the presence of organic material, and according to their biochemical activities they may be divided into two main groups—the saccharolytic group and the proteolytic group.

I. *The Saccharolytic Group.*

The members of this group vigorously decompose a variety of carbohydrates with the production of acid and gas, but they are only feebly proteolytic. The group comprises:

1. *B. welchii.* (Synonyms: *B. aërogenes capsulatus* of Welch and Nuttall;[1] *B. perfringens* of Veillon and Zuber;[2] *B. phlegmonis emphysematosae* of Fraenkel.[3])
2. *B. tertius.* (Synonyms: *Bacillus Y* of Fleming;[4] *B. von Hibler IX* or *B. rodella III* of Robertson.[5])
3. *B. fallax* of Weinberg.[6]
4. *B. aërofetidus* of Weinberg.[7]
5. *B. oedematiens* of Weinberg.[8]

Pasteur's *Vibrion septique* would seem to belong to this group, but it is omitted because we have had as yet no opportunity of establishing its characteristics.

The sugar reactions which have been found to hold good after a long series of observations are given in the following

abbreviated table, and would appear to furnish valuable evidence in the differential diagnosis of individual organisms from other members of the group. There are four types of *B. welchii* which differ from each other according to their reaction in inulin and glycerin. This finding confirms the observations of Simonds.[9] *B. tertius* resembles *B. welchii* in its sugar reactions, but ferments mannite and salicin in addition. *B. aërofetidus* does not ferment saccharose, and *B. fallax* attacks lactose only after several days, while *B. oedematiens* ferments dextrose, levulose, and maltose only, resembling the individuals of the proteolytic group in this respect. Certain strains of *B. welchii* are slightly proteolytic, and produce small quantities of amino-acids, and *B. aërofetidus* carries the digestion of protein still further, for it produces a very fetid odour in cultures. In neither case, however, is the proteolytic activity at all comparable to that which characterizes the members of the second group.

TABLE I.

	Dextrose.	Levulose.	Maltose.	Saccharose.	Lactose.	Mannite.	Glycerin.	Inulin.	Salicin.	Amygdalin.	Glycogen.
B. welchii I	+	+	+	+	+	−	−	−	−	−	+
„ II	+	+	+	+	+	−	−	+	−	−	+
„ III	+	+	+	+	+	−	+	−	−	−	+
„ IV	+	+	+	+	+	−	+	+	−	−	+
B. tertius	+	+	+	+	+	+	−	−	+	+	+
B. fallax	+	+	+	+	−	−	−	+	+	−	+
B. aërofetidus	+	+	+	−	+	−	−	−	+	−	+
B. oedematiens	+	+	+	−	−	−	−	−	−	−	−

II. *The Proteolytic Group.*

This comprises—

1. *B. sporogenes* of Metchnikoff.[10]
2. *B. histolyticus* of Weinberg.[11]
3. *B. putrificus coli* of Bienstock.[12]
4. *B. cadaveris sporogenes* of Klein.[13]
5. *B. tetani* of Nikolaier.[14]

The individual members of this group digest protein very vigorously, but have a restricted range in the matter of carbohydrate fermentation. *B. histolyticus* breaks down protein as far as the amino-acid stage, whereas the other members of the group push digestion still further to the ammonia stage. They all ferment dextrose, levulose, and maltose. It is probable that *B. sporogenes*, *B. putrificus coli*, and *B. cadaveris sporogenes* are closely related, if not identical.

The term *B. oedematis maligni* of Koch is intentionally omitted from the above list, for we believe that the organism described as such by English writers during the war is really *B. sporogenes* of Metchnikoff. It is significant, too, that no mention of Koch's organism appears in German literature published since the outbreak of war. Its place seems to have been taken by a bacillus which has been described independently by Aschoff[15] and by Conradi,[16] and which is taken by those observers to be a human form of Rauschbrand. It is of interest in this connexion to note that Nicolle,[17] as the result of serological tests, considers the *Vibrion septique* of Pasteur to be closely allied to, if not identical with, the bacillus of Rauschbrand. The organism of Conradi and Aschoff is said to produce in animals a solid oedema of the type which is so characteristic of Weinberg's *B. oedematiens*, but the strong saccharolytic powers attributed to it distinguish it from the latter.

THE INCIDENCE OF ANAËROBES IN WAR WOUNDS.

The production of a gaseous cellulitis in the tissues surrounding a wound is practically certain evidence of anaërobic infection, although it must be noted that the infiltration of gas may often out-distance the microbic invasion in the tissues. It is not uncommon to find no microscopical or cultural evidence of organisms in the oedema fluid taken from crepitant subcutaneous tissues at some distance from the wound. Another feature of anaërobic growth is the necrosis it produces in the invaded part. Quite apart from wounds which show these clinical manifestations, the majority of open wounds treated at a base hospital in France give cultural evidence of the presence of anaërobes. Out of 100 open septic wounds of all grades of severity examined at intervals of from two to twenty-two days after the receipt of the injury two-thirds showed the presence of *B. welchii*, and almost one-half showed the presence of *B. sporogenes* (see Table II). It is unusual to find only one anaërobe in a wound. In the vast majority of cases the anaërobe infection is a mixed one, the most frequent combination being *B. welchii* with *B. sporogenes*.

In contradistinction to these open wounds, we have had the opportunity of examining a large series of bloody effusions resulting from penetrating wounds of the pleura and lung. In most of the open septic wounds the anaërobes are implanted into, or come in contact with, damaged muscle, whereas in the thoracic injuries just mentioned, which might be looked on as closed wounds, the organisms carried in have to develop in a collection of ordinary blood. Out of 500 specimens of haemothorax fluid examined, 195 proved to be septic, and 44.6 per cent. of these were infected with anaërobes. Here, again, *B. welchii* is the most common infecting anaërobe, and the combination of this organism with *B. sporogenes* is frequent.

The anaërobes tend to remain localized to the tissues during life, and it is only seldom that they can be found in the circulating blood. On the other hand, cases have been recorded from time to time of so-called metastatic gas gangrene in which anaërobes have developed in some position at a distance from the infected tissue. This would seem to occur in a focus which has suffered slight damage, as from continuous pressure or from the introduction of a hypodermic needle, and it is certain that the organisms must have been conveyed through the blood stream. It is quite frequent, however, for anaërobes to become disseminated through the blood stream immediately before death. Out of 40 cases in which death resulted from wounds which were proved to be infected with anaërobes, the heart blood taken from one to twenty hours after death gave a positive cultural result on twenty-five occasions. In 20 of these cases *B. welchii* was found (that is, in 80 per cent.), and in 15 (that is, 60 per cent.) *B. sporogenes* was present.

TABLE II.

	Total Examined.	Total Septic.	Infected with Anaërobes.	Infected with B. welchii.	Infected with B. sporogenes
Open wounds 2 to 22 days old	100	100	72%	66%	48%
Haemothorax fluids	500	195	87 = 44.6%	71 = 36.4%	14 = 7.1%
Post-mortem heart blood	40	36	25 = 69.4%	20 = 55.5%	15 = 41.6%

THE PATHOLOGICAL PROCESS PRODUCED BY ANAËROBES IN THE TISSUES.

The incidence of anaërobic infection in wounds during the present war would seem to be determined by two factors. The first is the unavoidable soiling of a wound by earth or by clothing infected with faecal organisms. Secondly, the destruction of tissues produced in and around a wound by the modern missile gives rise to just those conditions which are most favourable for anaërobic growth.

The implantation of anaërobes in a focus of dead organic material is directly comparable to the inoculation of an artificial culture, and it is for this very reason that a laboratory study of the activities of anaërobes in artificial media is of service in determining the nature of the earlier pathological processes which follow infection of the tissues. In the wound, just as in the test tube, the members of the carbohydrate splitting group of anaërobes are the first to develop. The glycogen which is found in living healthy muscle is rapidly converted after death into dextrose and a small fraction of isomaltose. Both these substances are vigorously fermented by such an organism as *B. welchii*, and it is because of their presence that the organism in question so readily establishes itself in damaged muscle.

This early fermentation in muscle results in the formation of acid and gas. The latter consists of a mixture of

carbon dioxide and of hydrogen in varying proportions. It often develops with astonishing rapidity, and may become clinically evident four to six hours after the receipt of the wound. The appearance of crepitation in the subcutaneous tissues is probably due to gas which has escaped from subjacent infected muscle.

The gas may accumulate under considerable pressure, and, in so doing, it adds to the embarrassment of a circulation which is already impeded by the presence of inflammatory exudate.

Coincident with the production of gas is a formation and setting free of various organic acids. The acids which occur in the *in vitro* fermentation of carbohydrates by *B. welchii* retard and finally inhibit the growth of the organism, and, unless there is a high amount of available protein present, the culture dies out rapidly. If, however, some method be adopted of neutralizing the acid as that is formed, as, for example, by the addition of calcium or of magnesium carbonate to the culture, then the growth is not only much more luxuriant but its vitality is considerably increased.

In infected tissues such a neutralization is brought about by the inflammatory exudate, for the buffer salts of the serum constitute an absorbing reservoir which will take up any excess of free acid, and it is only when this considerable reserve is used up, if ever this does happen, that one can expect to find an increased hydrogen ion content of the circulating blood.

There is, however, another contributing factor to the neutralization of acid, a factor which comes into operation in the later stages of bacterial growth. The early rapid growth of the saccharolytic group is succeeded by the more gradual development of members of the proteolytic group. The protein constituents of the damaged tissues are attacked by the digestive ferments elaborated by organisms of this second group, and are broken down by successive stages. The final product consists largely of ammonia bodies, and it is these that help to counteract the acids resulting from carbohydrate degradation.

It is probably just at this point that certain saccharolytic organisms become proteolytic, and throw in their lot with the real tissue digesting organisms.

The gas formed in the proteolytic stage of wound infection is malodorous because of the development of sulphuretted hydrogen and certain volatile bodies.

It is probably during the proteolytic period also that the toxic products are elaborated which give rise to the clinical condition of toxaemia. It is very unlikely that such a condition is established as the result of carbohydrate fermentation. The clinical picture of a man dying with anaërobic toxaemia is chiefly that of a rapidly progressive circulatory failure, and death may come so abruptly that it is often falsely ascribed to pulmonary embolism. It never bears a resemblance to that state of "air hunger" which clinical pathologists have proved to be associated with blood acidosis.

One may, then, summarize the pathological processes in an anaërobe-infected wound as being characterized by two main features—the production of gas and the death of tissue. Each of the two main groups of anaërobes above defined has its share in these processes, and the successive stages by which an anaërobe infection develops may be thus summarized:

1. The initial trauma in determining the death of tissue establishes a focus for growth. This is characterized by the latent period, which precedes any obvious clinical signs of anaërobic infection.

2. The first active phase of anaërobic infection consists in the development of the rapidly growing saccharolytic organisms, of which *B. welchii* is the chief. It is because of the richness of muscle in fermentable carbohydrate that this tissue provides such favourable conditions for the growth of organisms of the saccharolytic type. Their development results in the production of acid and gas. The gas accumulates first in the muscle and reaches the subcutaneous tissues by escape from the muscle. The pressure produced by gas and also by inflammatory oedema fluid leads to an anaemic condition in the tissues surrounding a wound, and this change initiates the second active period of anaërobic invasion. The muscle in the saccharolytic period is of a brick-red colour.

3. The second phase of anaërobic infection in a wound consists in active proteolytic digestion. This is characterized by death and digestion of the tissues. The process is accompanied by the formation of sulphuretted hydrogen and of volatile substances, which give the penetrating putrefactive odour so typical of the later stages of infection. The previously red muscle becomes soft and diffluent. It may be stained black by a sulphide of iron formed by the interaction of sulphuretted hydrogen with the iron released from broken-down haemoglobin. The toxaemia which develops at this period results from the absorption of toxic substances produced in the breaking down of the protein molecule, and cannot be attributed to the acid which is formed in the breaking down of the carbohydrate molecule.

4. The final phase is that of successful bacterial invasion of the blood stream. It occurs in most cases just at, or immediately preceding, the death of the individual.

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

THE VALUE OF PURE CARBOLIC ACID IN THE TREATMENT OF SEPTIC WOUNDS.

WE are apt to forget the value of old remedies in the multitude of new ones, which, admirable and useful as they may be in many cases, are often not so well adapted for the particular purpose for which they may be employed. The special class of septic wounds referred to is that in which the destruction of soft tissues has led to ill-defined attached portions of dead skin, subcutaneous tissue, or muscles. Much of such tissue it may be possible to cut away, but there is always more or less left which Nature must detach itself, and so long as such necrosed tissue remains adherent it is a veritable hotbed for the development and multiplication of pathogenic and saprophytic organisms not only capable of exciting active local mischief but proving also a fruitful source for septic absorption. It is difficult to get at these deeply embedded organisms by means of any of the more modern solutions recently introduced, or by any of the various methods adopted in their employment. But to soak all necrotic tissue freely with pure carbolic acid is to effect complete sterilization.

Any who have tried this old Listerian practice—for it is to Lister that we owe it[1]—will bear out the statement that wounds so treated rapidly "clean up"; any advance of the acute septic process in the immediate neighbourhood of the necrotic tissue ceases; pain in the part is relieved; the temperature often falls, and, in every way, both the patient generally and the part locally show signs of rapid improvement.

I have been induced to draw attention to this old method because I have failed to notice any allusion to it in the many contributions that have recently appeared in the journals on the subject of *septic* wound treatment; and still more for the reason that the abundant opportunities which the present war has afforded of testing its value in the particular class of cases referred to have amply justified its use in the way originally suggested and employed by Lister.

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[1] *The Collected Papers of Joseph, Baron Lister*, vol. ii, p. 38.

ADRENALIN IN ANGIONEUROTIC OEDEMA.

THIS disease, though rare, is very distressing and intractable. In the following case, that of a lady aged 39, it lasted for three years, and resisted all the reputed

remedies. The first symptoms were numbness, tingling, and itching. The complexion became waxy, and the patient felt thoroughly depressed. The itching increased, and the part gradually reddened, then became erythematous, being well raised above the surface. The intense pruritus got worse the first day, remained stationary the second day, and on the third day gradually cleared up. The usual sites were: (1) Both eyelids, in which case it spread over the face, forming a huge urticarial and erythematous patch; (2) centre of the lower lip; (3) the interdigital spaces, spreading all over the fingers, chiefly the dorsum. The intense pruritus could only be controlled by holding the hand (when it was the hand that was affected) in a lavatory basin, and keeping the water running. Lotions and ointments of the usual type "got hot," and bandages had to be removed.

The chief exciting cause was worry, especially recurring sources of worry. The pruritus recurred very frequently, with only a few days' interval between successive attacks. Owing to the suddenness of the onset, the patient was often unable to go out to dinner; while dressing for dinner it would come on and quite disfigure her. The frequency would be much reduced during holiday, it rarely showed itself at such times, but on return from holiday it would speedily return. On one occasion, at the end of a visit to the West Coast of Scotland, she had intense pain in the right ear; there was nothing to account for it, and it disappeared in the morning; but during the journey, while on a steamboat, it returned with great intensity.

In the earlier part of the treatment she had, internally, calcium lactate, sodium salicylate, and nitroglycerin; and, externally, Lassar's paste, lotio calaminae, lotio plumbi, resinol, and many other remedies, but without any obvious effect. Then I tried adrenalin injections. I gave 4 minims of solutions of adrenalin chloride or epinine. The immediate effect was rather remarkable. The insertion of the needle was particularly painful; the patient then felt she was "going lifeless," a sensation almost like one of impending death; she was intensely anxious and dared not move, but lay quite horizontal. She had a numb feeling, beginning at the toes and gradually spreading up the body, and she felt as though she was being blanched. At this time there was definite pallor, which increased, and the pulse distinctly waned and became flickering. There was a zone of pallor round the injection, and always a black stain at the site of puncture. The unpleasant apprehensive feeling speedily passed off, and she felt quite well again. If the rash were fully out it took several hours to disappear, but when given in the first stage of numbness and itching the injection would abort the attack at once. After a few injections and observation of the specific effect I gave her suprarenal tablets three times a day. At first the attacks were diminished in frequency and severity, and eventually they ceased.

There were two patches, one on the back of the neck and one on the inner side of the knee, which came up in a similar way, but they were more raised and much more severe than the others. Although they yielded to adrenalin they did not disappear but left a lesion like psoriasis, which persisted for months. The patch on the neck received one dose of *x* rays, which produced a violent reaction and dermatitis, but it subsequently cleared up. The other remained stationary for years without causing trouble, and it has now almost disappeared.

It is now four years since any lesion has appeared, and the condition might be regarded as cured.

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ANTHRAX IN UGANDA.

AN adult male Swahili, a lamp cleaner on the Busoga Railway, taken ill four days previously with shivering fits and pains in chest, appeared acutely ill when admitted to hospital. Respiration was rapid, cough constant, and expectoration free; pulse 120, respirations 40, temperature 102° F.

There was marked deficiency in resonance over the whole of the left lung, with diminished air entry and tactile vocal fremitus, numerous moist râles throughout the left side of chest, with jerky "cogwheel" inspirations, and few crepitations scattered throughout the right lung. The apex beat was ill defined and the heart sounds muffled. Clinically the case presented a typical picture of acute pulmonary tuberculosis, but in view of the existing plague epidemic the possibility of pneumonic plague had to be considered. Microscopical examination of the sputum for tubercle and plague bacilli showed that both were absent, but anthrax bacilli, with marked granular staining, were found to be numerous.

The patient was isolated. He died on the evening of the sixth day after admission, after about ten days' illness.

Post-mortem Examination.

There was a considerable quantity of straw-coloured fluid in the pericardium and a small amount in the pleural cavity. The left lung was extremely congested and oedematous, with patches of grey hepatization, which in parts had broken down into small caseating masses. Except for a small amount of congestion and oedema, the right lung was normal. The trachea was congested and the bronchial glands considerably enlarged. Films taken from the broken-down patches in the left lung showed anthrax bacilli. The liver and kidneys were somewhat congested; the spleen was enlarged and congested; no bacilli were found in a smear from the spleen.

The case is noteworthy for its rarity. It is, I think, the first case reported in the Protectorate. The man stated that he never came into contact with cattle or hides. Considering the large numbers of cattle and the extensive trade in hides, it is surprising that cases do not occur more frequently.

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TONSILLECTOMY.

LIKE most of us, Dr. Stirling (BRITISH MEDICAL JOURNAL, June 9th, p. 765) considers the method he is used to for the performance of this operation is by far the best. With an experience of over four thousand tonsil operations the method that gives me the most satisfaction is that by the use of O'Malley's instrument: removing the right tonsil first, then changing the instrument to the left hand for removing the left tonsil. I find ethyl chloride the most satisfactory anaesthetic.

Wimbledon. VINCENT GREEN, M.D.Edin.

Reports of Societies.

TROPICAL DISEASE IN THE BALKANS.

AT a meeting of the Medical Section of the Royal Society of Medicine, held on Tuesday, June 12th, Sir RICKMAN GODLEE being in the chair, Major ALDO CASTELLANI delivered a lecture on the tropical diseases found in the Balkanic zone.

Malaria.

In the course of his lecture he said that the allied troops in the Balkans were exposed to many tropical diseases. That most frequently met with was malaria, the protean nature of which, though formerly well known, had been again brought into prominence. Pernicious cases were common in the late spring, summer, and autumn. The symptoms might simulate many other diseases, and a wrong diagnosis might easily be made with very serious results. Cases with symptoms pointing to lesions of the central nervous system were far from being rare, and he had met with the following types: (1) comatose, (2) delusional, (3) cerebro-spinal meningitis, (4) hemiplegic or monoplegic, (5) bulbar, (6) cerebellar, (7) tetanic, (8) eclamptic, (9) aphasic, (10) amaurotic, (11) spinal. The classical varieties of malaria as described in the books were not frequent. A purpuric and haemorrhagic form had occurred and resembled scurvy. It was marked by petechiae and haematomata, spongy and bleeding gums, and sometimes bleeding from mucous membranes. The spleen, however, was enlarged, and although parasites were found in only about 10 per cent. of the cases, they reacted to treatment by quinine. Another blood condition which might be closely imitated was pernicious anaemia. The patient was generally a young man or woman with the typical pallor and lemon yellow tint of pernicious anaemia; in some cases the liver was enlarged, or more rarely the spleen; there was either no fever or very little.

The blood might be negative for malaria on repeated examination, and show most of the common features of pernicious anaemia, including a high colour index. In old individuals the profound anaemia might give rise to the suspicion of internal cancer.

He had come across cases of malaria simulating other specific infectious diseases. The typhoid type was far from sure; the patient looked like a case of typhoid, and the temperature was typhoid-like, whilst the spleen was large but not hard. Bacteriological examinations for typhoid and paratyphoid infections, however, were negative, whilst the blood was full of malaria parasites which in this type of case were very little influenced by quinine. He had seen cases of pseudo-cholera and pseudo-dysentery of malarial origin, and also of pseudo-tetanus due to the same cause.

Several diseases of the digestive system might be simulated by malaria—for example, appendicitis and cholecystitis. Malaria might affect the respiratory and circulatory systems. He had seen several cases of dry bronchitis of malarial origin and one case of pneumonia-like consolidation with bloody expectoration, and also three cases of typical angina pectoris, all cured by the administration of quinine. Heart-block, of which he had seen one case, and tachycardia and cardiac arrhythmia might be malarial. He had met with cases of peripheral arteritis due to the same cause, and also neuritic cases resembling beri-beri and others of local oedema.

As regards the diagnosis of the malady in the Balkans, he suggested the following rules:

1. Whatever the symptoms of the cases, one should always keep in mind the possibility of malaria.
2. A negative blood examination is of no importance whatever, unless the examination is repeated many times and at different intervals.
3. If quinine does not influence the fever, this does not always exclude malaria.
4. While giving very great importance to laboratory methods—for it is only by this means that a positive diagnosis can be made with certainty—do not neglect the clinical examination of patients. Train your senses as much as possible. The importance of simple inspection and of simple palpation can hardly be exaggerated. A slight abnormality of the colour and pigmentation of the skin, easily overlooked by the inexperienced, may suggest a diagnosis of probability in an obscure case, and acting on it may perhaps save the patient's life.

For treatment of the disease in the Balkans, quinine was by far the most important drug; it should always be given in very large doses, at least 30 to 60 grains daily, by the mouth in ordinary cases, by intramuscular injection in severe cases, intravenously in the pernicious forms. It must be admitted, however, that there were cases which responded very slowly to a simple quinine treatment. In them, other drugs had been tried, such as arsenical preparations, antimony, and picric acid. When given alone none of these had much effect, but when used as adjuvants to quinine some of them (arsenic, for instance) seemed to increase its beneficial action. A treatment which had given him good results in certain cases was a combination of quinine, phosphorus, and tartar emetic.

The prognosis was good in the enormous majority of cases if efficiently treated, but it must be remembered that in pernicious cases a high mortality might occur despite energetic treatment, and that in a large number of cases, even of the benign form, the cure was merely clinical, complete sterilization not having been achieved. The affection lay dormant for months and years, and any cause lowering resistance, such as chill or traumatism, might cause the acute symptoms to reappear.

Intestinal Infections.

Next to malaria, the diarrhoeas and dysenteries were the most common affections. The majority of cases of dysentery were of bacterial origin, but numerous cases of amoebic type were also seen. Cases of enteritis due to flagellates, and, much more rarely to ciliates, occurred. Coccidiosis had been observed. Cholera and paracholera had been rare. Attention should be called to the choleraic type of bacterial dysentery, also to a peculiar type of diarrhoea seen in Serbian soldiers who had suffered terribly from starvation during the Albanian retreat, and which closely resembled the famine diarrhoea observed in India.

Camp jaundice was common. Two varieties might be distinguished: (1) a very severe type with high fever, lasting ten to twelve days and showing occasional relapses—true Weil's disease, which was rare; (2) a mild type, often febrile and very common. Weil's disease was, of course, of spirochaetic origin, but, in his opinion, it was probable that many cases of the mild type were also spirochaetic. In addition to true camp jaundice, there were also cases of jaundice due to malaria, to paratyphoid, and to streptococci; nor should the icteric type of relapsing fever be forgotten.

Enteric diseases were fairly frequent in the Balkans, but recently had not taken any epidemic form. In certain districts paratyphoid A and B were more frequently met with than true typhoid. Similar fevers due to various intra-intestinal germs were not rare. Lurie and himself had found cases due to *B. columbensis*. Attention should be paid to the not rare association of mixed infections of the typhoid and paratyphoid organisms. He had seen two cases in which there was infection by all three.

Other Diseases.

Malta fever was not common. Major Castellani had only seen two cases in Macedonia, and the kala-azar of adults he had never seen in the Balkans, though he had met with many cases of the infantile type in certain islands of the Adriatic and Aegean Seas. Relapsing fever was quite common. In its treatment he had obtained the best results by a combination of salvarsan, neo-salvarsan, or galyl, with tartar emetic. Typhus exanthematicus was, at the present moment, very rare, although a terrible epidemic raged in 1914 and 1915. Trench fever was occasionally met with. Both of the types described in France had been recognized in the Balkans.

Pappataci fever was extremely common in certain parts of the Balkans, especially in the late summer and early part of the autumn. It was often erroneously diagnosed as dengue, though a few cases of the latter had probably occurred. A distinguishing feature of pappataci fever was the flushing of the face, which had often the appearance of being slightly bloated. This flushing sometimes amounted to an erythematous rash, which also involved the neck. This flushing was very persistent, and lasted long after the fever was over. The mucosa of the soft palate presented a peculiar appearance, numerous small hyperaemic roundish spots, sharply limited by a line of demarcation between the hard and soft palate, being visible, which also persisted after the temperature had dropped. Leucopenia served to distinguish it from incipient typhus.

Pellagra was quite common in several districts of Macedonia, but he did not think there was any danger for our troops. Bronchomycosis and bronchospirochaetosis were observed. Of the tropical diseases which were of rarer occurrence, he mentioned filariasis, sprue, intestinal myiasis, mycotic, spirochaetic, and flagellatic urethritis.

Certain tropical skin diseases were frequently met with. The following were a cause of great discomfort in summer, and were often wrongly diagnosed: Dermatitis interdigitalis, epidermophytis or "mango toe," tinia cruris or "dhobie itch," prickly heat, various types of tropical pyosis, such as pyosis mansoni, pyosis discoides, etc. He had seen in 1915 in Macedonian peasants cases of ulcus tropicum, oriental sore, ulcus infantum, blastomycosis, sporotrichosis, accladiosis, etc., and also numerous cases of trichomycosis axillaris flava, nigra and rubra; of intertrigo saccharomycetica, and various other hyphomycetic affections. He had also observed two cases of Madura foot, two of keratoma plantare sulcatum, and one of ainhum.

A REPORT issued by the New York Committee on the After-care of Paralysis Cases states that 9,063 cases of infantile paralysis occurred during the epidemic of anterior poliomyelitis. The number of deaths from the acute disease was 2,308, leaving 6,755 for after-treatment. Of these 5,003 are still receiving treatment under medical supervision, 1,073 are under the care of private practitioners, 102 have been discharged as cured, and 95 have died; 31 refused treatment, 68 have left New York, and 388 have been lost sight of. The committee was enabled to carry on its work by a fund of £31,689 raised by public subscription.

Reviews.

FRACTURES.

THE *Treatise on Fractures*,[1] by J. B. ROBERTS and J. A. KELLY, is one of the most readable books on the subject that we have met with. It is full and complete, all fractures, whether common or rare, being dealt with. The views as to treatment are eminently sensible. The authors make no special plea for any one form of treatment, but hold that the great majority of fractures, in capable hands, will give good results with the old methods of fixation, passive movement, and massage. They consider that in the past sufficient attention has not been paid to fractures, and that the rise of interest in abdominal surgery has caused their treatment to be neglected. Insufficient pains have been taken to keep the soft parts in the neighbourhood of the fracture in good condition, fractures being often "put up" and left for long periods undisturbed. In hospital practice it has often been the custom to relegate the care of fractures to officers of no great experience; whereas to obtain the best results will often tax to the uttermost the skill and patience of a surgeon of experience.

The authors believe that much can be done by the old-fashioned methods, but admit that in certain cases open operation is essential. Indications for operation are fully discussed, and plating, wiring, and bone-grafting methods are well described.

The book is beautifully illustrated throughout by photographs, *x*-ray plates, and diagrams. The latter, showing the action of the various muscles causing displacements of fragments, will be found specially useful. The prognosis of the various fractures is fully dealt with, and the statistics given as to frequency, time of union, and period of disability should prove of use as guides to treatment. The only criticism that can be made is that the authors have not slightly enlarged the book by adding a chapter on dislocations.

OPHTHALMOLOGY.

THE eighth edition of DE SCHWEINITZ's handbook of *Diseases of the Eye*[2] is a handsome volume well worthy the study of those to whom it is inscribed—"Students and Practitioners." Since the first edition was published, in 1892, it has been one of the most popular of the larger American textbooks, and this popularity has extended not a little to this side of the world. In the new edition the chapter on iritis has been in the main rewritten, particularly that section relating to autotoxaemic iritis and iritis secondary to infections of the mucous membranes. The section is well done, but the illustrations of keratitis punctata, or precipitates on the back of the cornea in uveitis, are somewhat more than diagrammatic, and little likely to suggest the delicacy of these lesions to the average student. Lieut.-Colonel Elliot, I.M.S., has written a section on the operation of corneo-scleral trephining for glaucoma; and Dr. William Sweet a description of his revised method of localizing foreign bodies within the eye by means of *x* rays. Besides these, considerable changes have been made by the inclusion of details of the technique of several new operations, for cataract extraction, for squint, and on the nasal duct. No one who had the opportunity of meeting the author of this volume, or of hearing him speak at the last International Congress, could doubt that the style of his writing would be any other than grateful to English tastes, and not the least pleasing feature of his book is the frequency with which names well known in these islands are mentioned, for the author is as diligent a student of British literature as of his own or of Continental literature.

Dr. TERSON's book on ophthalmology[3] has been written for the general practitioner, its object being to indicate those conditions which he may safely treat and to teach him how to render first aid to patients whom he must send on to a specialist. A general grasp of ophthalmology should be demanded by the examination bodies from every candidate, and a certificate that he has dressed in the eye department of his hospital should be as essential as one which certifies that he has had instruction in vaccination or midwifery. Only by practical work among actual patients can he learn to distinguish serious from trivial affections of the eye. No book, however good, can take the place of clinical work. This statement is as true of ophthalmic surgery as of all other branches of medical study. We cannot place the book before us upon an equality with many others which are in use in this country and on the Continent. The illustrations are poor and there is much to criticize in the subject matter. The use of the ophthalmoscope is regarded as beyond the capacity of the general practitioner, and yet this instrument is almost as essential in the diagnosis of disease as is the stethoscope. Testing for colour-blindness, a duty which every railway medical officer must perform, is dismissed with the bald statement that all that is necessary is a set of Holmgren's wools. We are bound to believe that Dr. Terson is not ignorant of the voluminous literature which has appeared during the past ten years tending to show that this method of testing is unreliable and that it has been abandoned by most of the navies and by many of the railway companies in Europe. In treating of corneal ulcers, the use of atropine, the sheet anchor of treatment, is not mentioned, nor is a bandage spoken of. Simple lavage of the lacrymal sac is held to be very dangerous, far more so than the passage of probes. In countries where trachoma is common there is a danger, but elsewhere lavage of a lacrymal sac is a safe and efficient procedure which can be carried out by any medical man who will inform himself of the technique and will obtain a suitable cannula and syringe. Dr. Terson emphasizes the danger of using a mercurial preparation for the eye of a patient who is taking any form of iodine internally. This is a common mistake; frequently a child is given the yellow oxide of mercury ointment for massage into the globe, and at the same time iodide of iron is prescribed internally. The result is that nascent biniodide of mercury is formed in the tissues of the eye, a caustic salt which causes great irritation.

A REGIMENTAL SURGEON IN WAR AND PRISON.[4]

THIS very interesting book falls naturally into two parts. The first begins somewhere in the middle of the retreat from Mons, when Captain DOLBEY joined the K.O.S.B., and ends with his capture by the Germans. The second describes his captivity. The first part is extremely well done, and we recall no more vivid picture in recent war literature than that of the last days before his extemporized hospital was surrounded by the enemy, and its officers and wounded captured near La Bassée during the first battle of Ypres. Captain Dolbey has some striking remarks on the duties of a battalion medical officer when his regiment is fighting. "A regimental doctor," he says, "who is not up with the companies is no good. . . . Most important is it that a responsible person, though medical officer himself, should go where his stretcher-bearers do; for there are good and bad stretcher-bearers, and if the search for the wounded is not systematically laid out by the doctor, he may be certain that some will be left out all night." In another place he speaks of the difficulty in certain lights of seeing a khaki-clad man lying on ploughed land.

After capture he suffered many indignities and much hardship on his road to Crefeld, where he was given charge of the wounded, and relatively well treated. He was moved to Minden at the end of November, 1914, where were soldiers (French, Belgian, and a few British) and a number of British civilians. Less than a month later he was sent to Sennelager, where, as is already known, German medical mismanagement and incompetence seems to have reached a depth of depravity not surpassed elsewhere before or since. "The camp was swept by almost every infectious disease—scarlet fever, pneumonia, dysentery of both kinds, cerebro-spinal meningitis, mumps,

[1] *Treatise on Fractures.* By J. B. Roberts, A.M., M.D., F.R.C.S., and J. A. Kelly, A.M., M.D. Philadelphia and London: J. B. Lippincott Co. 1916. (Med. 8vo, pp. 702; 909 figures. 25s. net.)

[2] *Diseases of the Eye: A Handbook of Ophthalmic Practice for Students and Practitioners.* By G. E. de Schweinitz, M.D., LL.D. Philadelphia and London: W. B. Saunders Company. 1916. Eighth edition, reset. (Roy. 8vo, pp. 754; 387 figures, 7 plates. 25s. net.)

[3] *Ophthalmologie du Médecin Praticien.* Par le Dr. A. Terson. Paris: Masson et Cie. 1916. (Post 8vo, pp. 484; 347 figures. Fr. 12.)

[4] *A Regimental Surgeon in War and Prison.* By Captain R. V. Dolbey, M.B., M.S.Lond., F.R.C.S.Eng., R.A.M.C. London: John Murray. 1917. (Cr. 8vo, pp. ix + 218. 5s. net.)

and measles"; but the German medical authorities either could not diagnose these diseases or deliberately shut their eyes to the facts. For a memorandum drawing attention to the indubitable occurrence of cerebro-spinal meningitis, and asking that suitable precautions should be taken and suitable treatment provided, he was put into a punishment prison. Early in March, 1915, he was sent away to an officers' camp at Gütersloh, where he found the commandant, "suspected on fairly good grounds of having a Scottish wife in Aberdeen," very full of hatred to the English. "How he hated us! And how we cherished that hatred! What a compliment to the English and all that we are doing in the war!" Captain Dolbey met with much ignorance, incompetence, and cruelty in the German military hospitals and in the so-called hospitals of prison camps, but he tries to be just. He tells of one German military hospital where he found efficiency and kindness, and has a good word for the Prussian who, he thinks, may fear God and the Kaiser, but does not fear anything else, and does not kill prisoners as do the Saxons, Würtembergers, and especially the Bavarians. "Often the worst instances of butchery of stretcher-bearers and other unarmed prisoners may be put to the credit of the young officers of the Bavarian, Würtembergian, or Saxon troops."

NOTES ON BOOKS.

A FOURTH edition has appeared of Dr. BLOMFIELD'S little manual on *Anaesthetics*,[5] which has proved useful to many medical students needing a brief practical guide to the principles upon which common anaesthetics are selected and administered. A few words on anaesthetics in military practice are added to the present edition.

In *The War and the Nation*[6] Mr. DAMPIER WHETHAM applies his talent for sociological inquiry to a critical examination of the past, present, and future of national organization. From the beginning the author avows himself a "constructive Tory," and in frank disagreement with the notion that the downfall of the feudal system was of benefit to the people of Europe. His book is a thoughtful contribution to the problem of after-war policy. It deserves study from all who feel with him that the war has blurred the old, bad, party lines, and that when it is over the whole people will remain one national party, ready to learn from each other's merits and shortcomings, and to work together in the task of reconstruction for the common weal. Mr. Whetham is outspoken in his criticism of the political dogmas at each end of the former party system, but we fail to find any evidence of rancour or provocation in his essay. Medical readers in particular will find much that is interesting and suggestive in the chapter on "The War and the Race."

Among a number of interesting papers read to the members of the American Otological Society at its forty-ninth annual meeting,[7] held in May, 1916, at Washington, D.C., is one on a "Case of syringomyelia with marked vestibular symptoms," by Dr. G. E. Shambaugh of Chicago. The patient, a mining engineer aged 28, had suffered for two years from occipital headache, latterly with ataxy and vertigo and difficulty in reading. He showed alternating horizontal nystagmus, and examination of the functions of the vestibular nerves proved that, while the internal ear was not directly involved, the central tract of these nerves was not intact. Examination by a neurologist showed that the sensations due to touch, to pain, and to heat on most of the left side of the body were much diminished, and even lost in certain areas. A history pointing to such disturbances could be traced back at least six years. The Wassermann reaction proved negative, as did examination of the cerebro-spinal fluid. Dr. Shambaugh concludes that the syringomyelic process had extended in this patient past the medulla into the region of the fourth ventricle, and that the case is one of syringobulbia.

[5] *Anaesthetics: A Practical Handbook.* By J. Blomfield, M.D.Cantab., Senior Anaesthetist and Lecturer on Anaesthetics at St. George's Hospital. Fourth edition. London: Baillière, Tindall, and Cox. 1917. (Cr. 8vo, pp. 147; 22 figures. 4s. net.)

[6] *The War and the Nation: A Study in Constructive Politics.* By W. C. Dampier Whetham, F.R.S., Senior Tutor of Trinity College, Cambridge. London: John Murray. 1917. (Cr. 8vo, pp. 312. 6s. net.)

[7] *Transactions of the American Otological Society.* Forty-ninth annual meeting. Vol. xiv, Part I. New Bedford, Mass.: Mercury Publishing Co. 1916. (Med. 8vo, pp. 201; 4 charts.)

The *Medical Register*[8] for 1917 has been published. It contains, as usual, the list of registered medical practitioners including the colonial and foreign lists. The number of names added by registration during 1916 was 1,202, as compared with 1,526 in 1915, and an average of 1,297 for the last five years. The *Dentists' Register* for 1917 has also been issued. It is similarly divided into the list for the United Kingdom, the colonial list, and the list of foreign dentists registered in this country. The total number of names on the *Register* is now 5,512, as compared with 5,453 in 1916.

The Expectant Mother,[9] by Dr. S. W. BANDLER, is a book for lay readers. It discusses pregnancy, labour, and the *post-partum* period from the point of view of the mother, and aims at giving the general facts in which doctors, nurses, and intelligent members of the laity have a common interest. To those who have no medical knowledge the book, with its abundance of detail and precaution, will perhaps prove rather intimidating reading.

[8] The *Medical Register* for 1917. London: Published for the General Medical Council by Constable and Co. 1917. (Pp. 1283. 10s. 6d.) The *Dentists' Register* for 1917. London: Published for the General Medical Council by Constable and Co. 1917. (Pp. 162. 3s. 4d.)

[9] *The Expectant Mother.* By S. W. Bandler, M.D. Philadelphia and London: W. B. Saunders Co. 1916. (Post 8vo, pp. 405; 71 figures. 6s. 6d. net.)

MEDICAL AND SURGICAL APPLIANCES.

The "Luc" Syringe.

MESSRS. ALLEN AND HANBURYS, LIMITED, have sent us a sample of the "Luc" syringe, which has the great advantage over ordinary glass, or glass and metal syringes, of being unbreakable by heat. The graduated barrel is made from fused quartz glass, and when the piston is withdrawn, and the metal plunger rests in a safety expansion chamber, the whole syringe can be sterilized by dry or moist heat without further separation of the parts. If necessary, water can be boiled in the syringe over a flame. The metal case contains a tray, with clips for holding the syringe and a holder for two needles, and the complete apparatus can be sterilized together, so that the contents are ready for use in an aseptic state. All who use syringes for hypodermic medication, or for taking samples of blood for culture, will appreciate the convenience of this arrangement. The syringe, needle-holder, and case are strongly made, and the whole apparatus is handy and workmanlike. We have tested the glass tubing from which the barrels are made, and found that after holding in a Bunsen flame it can be immediately plunged into ice cold water without breaking.

A Needle for Intravenous Injection of Arseno-benzol Preparations.

Mr. H. W. ABBOTT, M.R.C.S.Eng., L.R.C.P.Lond., writes: The instrument I have devised, a woodcut of which accompanies this description, differs from other needles used for a similar purpose in that it has a handle on the upper surface of its mount, and over the centre of gravity of the instrument; this gives a perfect sense of balance. If the needle be held by its handle (not by the mount as is the usual method), the "grip" so obtained provides a greater delicacy of touch than has hitherto been possible, and the surgeon can easily give to the point of the needle any gradation of movement in order to insure its entry into a vein; in this way the perception of control is absolute. The mount is 1¾ in. long, and its form is such that, when the instrument is lying on a horizontal surface, the shank of the needle is directed downwards, thus ensuring that the point remains within the lumen of the vein after introduction. Further, by virtue of its length and the fact that each of its four surfaces is flat, the mount lies fairly and squarely on the skin during injection. In practice the needle has given extremely good results. It has been made for me by the Holborn Surgical Instrument Company, of Thavies Inn, Holborn Circus, and I am more than pleased with the excellence of the workmanship and the finish.

A FUND of £100,000 has been raised for the construction of the new St. Luke's Hospital at Tokyo. Of the total sum £15,000 was contributed by the Japanese; the remainder was collected in the United States.

British Medical Journal.

SATURDAY, JUNE 16TH, 1917.

MEDICINE AT MESSINES.

FIELD-MARSHAL SIR DOUGLAS HAIG, in a general order addressed to the General Officer commanding the Second British Army, says of the victory of the Messines Ridge, "our own casualties were for a battle of such magnitude most gratifyingly light," and everything one hears confirms the statement that in the offensive last week the objects were attained with very small losses. All previous offensives have caused a large wave at the base hospitals and have kept the casualty clearing stations of the forces engaged at work day and night. But on this occasion the casualty clearing stations all appear to have got through their work quite comfortably, there seems to have been hardly a ripple at the bases, and the wounded are reported to have reached them in very good order. The weather has been favourable, and the advance was strictly confined to its intended limits; the aim was to capture a range of strongly fortified hills that have dominated the whole situation on the true Flanders front ever since the end of 1914, and not to advance beyond these hills any greater distance than was necessary to secure the position. Consequently, very long carries of wounded men such as were a feature of the two recent advances at Arras and Bapaume were unnecessary. The whole area lying just in front of these hills has roads running parallel to them from end to end, and these have been kept in good condition, despite the heavy shelling to which they have been subjected for more than two years. Moreover, they have been joined up at frequent intervals by cross-roads. Advanced dressing stations were long ago pushed up close to the foot of the hills, and the casualty clearing stations were all easily accessible; they were among the very best equipped to be found on the whole front, for they are nearly all of them in hutted or other buildings of a more or less permanent type. The preparations for the attack were begun well in advance, and at one place, where the fighting promised to be heavy and did in fact prove so to be, a place which lies away from the main roads, two main dressing stations were provided—one for walking cases and one for sitting cases—within three or four thousand yards of the actual fighting. This place, it would seem, was excellently arranged, and the buildings, chiefly of wood, were connected up with the main roads leading to the casualty clearing stations by well-built tracks across the fields. In fact, the medical arrangements were clearly as well thought out as those of the fighting operations, and the whole affair moved like clockwork.

Apart from its strictly military importance the capture of this Wytschaete-Messines Ridge has distinct medical interest, for it dominated the salient held by the British between Wytschaete Hill and Ypres. Though little has been heard of this salient—during the last eighteen months or two years it has hardly been mentioned in the newspapers—those who have had occasion to visit the hospitals at home must have been struck by the number of men who said that they received their wounds in this area. It has, in fact, been the source of a steady stream of casualties ever since it was first established, and, moreover, they have not been of a light kind, for the ground is low-lying, highly cultivated alluvial soil, and teems with the organisms of gas gangrene and other infections. The extent to which this area can now be raked by the enemy will be greatly lessened, and the casualties arising in the salient will diminish correspondingly. The area as a whole, or rather its outskirts, is perhaps more familiar to people at home than any other scene of a large offensive, for it is the one to which most official visitors have been taken. At one end lies Popperinghe, with Ypres some eight miles in front, and at the other Bailleul, some six or seven miles from Armentières, the site of certain much described soldiers' baths, and close to the famous "Plug-street."

The splendid efficiency of it all may already have made the men on the spot forget the anxious period of preparation, but we at home must not be unmindful. The careful testing for weeks and months beforehand of every link, from the organization of the battalion stretcher-bearers and the choice of aid posts back through the ambulance trains to the bases; the careful estimate of the capacity of each field ambulance and casualty clearing station, the questioning of their numerical adequacy, the debating of the need for pushing up more units or of reinforcing those already established but not perhaps quite strong enough to cope with a large influx of seriously wounded men—all this has meant months of anxious work. Happily all has gone well, and anticipation was in advance of realization; but let us imagine what would have happened if the converse had been true, though we need not draw on our imagination, for we know a part at least of what happened at Gallipoli and in Egypt and in Mesopotamia. Let us also bear in mind to-day the labours and anxieties of the Army Medical Department at home to meet all needs in men and material of those responsible for the medical conduct of the operations of the army that faced the Messines ridge on the night of June 6th–7th. Finally, let us remember that 98 per cent. of the officers serving under Sir Arthur Sloggett in France were civilians when the war began and will be civilians again when the war ends. It is a fine record of which any profession could be proud; we have been privileged to serve the country in its need in our own way by the practice of our own beneficent calling; and in courage in the field, in skill in the field ambulances and casualty clearing stations and base hospitals, and in devotion to duty in every part of the great military medical machines with the armies in France there has been no faltering, but wise foresight to prepare and eager enthusiasm to fulfil.

MILITARY HOSPITAL ECONOMIES.

IN the BRITISH MEDICAL JOURNAL of May 12th last attention was called to the lack of economy due to the multiplication of small Voluntary Aid hospitals. It seems not unlikely that in the near future the whole system of auxiliary military hospitals will come in for adverse public criticism, and we would venture to appeal to the Director-General of the Army Medical Service to investigate the position impartially with the profession of which he is so distinguished an ornament, and to accept the co-operation of his civilian colleagues, especially that of the professional committees which are so closely concerned in a matter affecting the distribution of doctors both for military and for civil needs.

To the Territorial general hospitals established in large centres are linked a number of smaller hospitals. Some of these are section hospitals more or less directly under the control of the Territorial general hospital, others are Red Cross and Voluntary Aid hospitals which we understand are visited and inspected by members of the staffs of the Territorial general hospitals. Thus the 1st London Territorial General Hospital at Camberwell has a section hospital of 200 beds at St. Bartholomew's Hospital, and is responsible also for the inspection of six or seven Red Cross hospitals. The latter are staffed generally by local practitioners, and the intention would appear to be that they should be visited once a week by a member of the staff of the Territorial General Hospital. The small auxiliary hospitals were formed as a result of appeals by county directors of the Territorial Force Associations, the organization of the hospitals being delegated, as a rule, to the British Red Cross Society. Such hospitals have been established in very large numbers throughout the country, and their number has recently been increased. We are not aware that the total number of these small hospitals has been stated, but it appears that in one command alone there are some 350 of them in addition to the large military or Territorial general hospitals. The number of beds in a Voluntary Aid hospital varies very much—probably the usual range is from 30 to 70; but hospitals are believed to exist, or have existed, with as few as 7 beds, while others may contain 200 or 300.

From the public point of view several questions may be raised with regard to auxiliary hospitals. We have already endeavoured to show that the multiplicity of small hospitals is uneconomical. But wider questions are involved. The primary function of the military hospital is to return a soldier to the fighting forces as quickly as possible. A second duty is to repair, as far as practicable, the man who will never be fit for service again, in order that when he returns to civil life he may be as self-helpful as possible. Is the best being done for the country in all the auxiliary hospitals in the way of rendering possible the rapid return of the soldier to the combatant ranks? Is the best being done in the way of treatment and training for the man who has been injured in his country's service and must be discharged from the army to civil life? And, lastly, is the medical man-power available being used in the most effective and least wasteful way possible?

All the evidence available seems to show that the answer to each of these questions is unsatisfactory. Apparently the initial sorting of wounded who arrive in this country has hitherto been defective, so that suitable cases do not invariably reach suitable centres. In some instances the staffs of many small hospitals have given as a reason for urging the importance of the work carried on in their hospital that they receive convoys direct. In any case, although many small hospitals near large centres are largely used for convalescents, it seems certain that quite a number of small hospitals throughout the country become possessed of patients who require some form of special treatment unobtainable locally. How is the future of these patients controlled?

As we have said above, the auxiliary hospitals are for the most part regarded as annexes of the large Territorial general hospitals, to be controlled and inspected from these hospitals by the members of their staffs, most of whom are already carrying on civil as well as military work. In addition, the War Office has appointed certain inspectors and other officials. Thus each command has a consulting physician and a consulting surgeon, but the real function of these officers is consultation as to treatment, and not inspection. In the Military Orthopaedic Department, the inspector, Sir Robert Jones, has several deputy inspectors, while Colonel Aldren Turner is inspector for the Neurological Department.

Auxiliary hospitals in the same town as a Territorial general hospital, or in the immediate neighbourhood, are no doubt subject to effective control and inspection. But in regard to, say, 300 small hospitals scattered over sparsely populated country districts where public means of communication are scanty and roads often hilly and badly kept, is it conceivable that with so few officers as have been mentioned the control can be other than of the mildest description, or the inspection other than rare? To inspect such a hospital in a remote country district, a busy member of the staffs of military and civilian hospitals, engaged moreover in private practice, must leave his ordinary work. How many men are available? How often can they make their visits, and how long will it take them to go round the 300 or more hospitals in a command? Again, how often are the inspectors of the orthopaedic or neurological departments able to visit all the hospitals within their areas? Yet without such inspection numbers of cases must be held up without the special treatment required. Are there not from time to time many men who ought to be in command dépôts, or even back with their regiments, waiting for travelling medical boards to decide what should be done with them? It would be interesting to know how frequently each hospital is visited by these boards. Take as a hypothetical case an auxiliary hospital with fifty beds in a country place, and assume that it has forty patients; thirty of these, perhaps, will be men who merely want ordinary treatment, or are convalescent and waiting to be sent to command dépôts. Of the remaining ten, perhaps three or four require special orthopaedic treatment, two or three are neurasthenics or suffering from shell shock, one or two may have sustained comminuted fracture of the jaw, and the remainder may, perhaps, be suffering from chronic heart or kidney disease or tuberculosis. Such cases may require special treatment, or would be more likely to be restored to fitness by treatment in special hospitals. The machinery for picking out such cases seems to be inadequate, and it is no uncommon complaint at special hospitals that patients have been allowed to remain at small hospitals until cure has become difficult. If suitable machinery were devised, or if a sufficient number of expert inspectors were available, it would probably be found possible to reduce the number of small auxiliary hospitals, so saving medical personnel, and to use country houses and the like only as convalescent homes to which men might be sent for a month or six weeks. At the end of this period the soldier might be sent automatically to a command dépôt, or back to the Territorial general hospital for decision as to his future. If men are allowed to remain in the hospitals too long, or if unsuitable cases are being retained which could be better treated elsewhere, then not only is there a waste of beds and of the men's time, but also of medical time and energy.

It is necessary, therefore, for the Army Medical Department to solve the problem of ensuring such efficient inspection (1) that only suitable cases are sent to each hospital; (2) that trivial cases are discharged as soon as possible to command dépôts with a view to their return to the army; (3) that treatment started abroad or in Territorial general hospitals at home is properly continued; (4) that

patients not making satisfactory progress are weeded out, and dispatched elsewhere; and (5) that special cases are referred to special centres without loss of time.

In our view the problem cannot be solved by an overworked and understaffed department, manned almost entirely by officers trained in peace time in the routine of a small regular army, for they can, from personal experience, know little of civilian needs. Much of the good work already accomplished is due to the unceasing efforts of temporary officers who have striven against the dead weight of official methods. Once again we urge the Director-General to take the wide and impartial view of the situation of which he has so often shown himself capable, and, for the sake of his department and its achievements at the front, so to modify conditions at home as to combine the highest efficiency with the economy the application of which cannot much longer be delayed.

THE MEDICAL ASPECTS OF MATERNITY AND CHILD WELFARE.

THE appalling loss of young adult life during the last three years, and the horrible probability of its continuance for an indefinite period, have brought home to every one the need for the preservation of the oncoming generation, and for the arrest of the present scandalously high rate of infant mortality. The daily returns of casualties in the one case tell the tale only too plainly, but in the other no record is published of the loss of life that goes on unceasingly in peace as well as in war. If such records could be similarly published from day to day the public conscience would indeed be stirred, and demands for preventive legislation would be made on every hand. For the moment, however, the matter must be dealt with locally, and already in Edinburgh a scheme has been started which may well be taken as a guide by other local authorities who have the power to establish the necessary machinery. A very comprehensive plan was devised last year by Dr. Williamson, medical officer of health, but was found to be too large for adoption at the present time, and a modified scheme has now been approved by the City Council. An account of this scheme will be found in our issue of March 10th, p. 348. In the meantime a very valuable contribution to the whole subject from the medical point of view has been made by the Royal College of Physicians, Edinburgh, which has recently issued a full report[1] of the papers read in the course of a discussion at the Edinburgh Pathological Club. These papers cover almost all aspects of the problem to be dealt with in protecting the health and well-being of infants up to school age, and are in every case written by experts in the particular branches to which they relate.

An all-important, but much neglected, factor in the management of infant life is the regulation of the pre-natal period. The ill health of the baby is too often the result of carelessness or neglect of her own health on the part of the mother, and as this depends in the majority of cases upon sheer ignorance it is very necessary that means should be established to bring expectant mothers of the more ignorant classes under the supervision of skilled advisers. For this purpose maternity centres are strongly advocated and all possible means adopted to induce such mothers to register thmselves and to take advantage of the advice that may be tendered to them.

Maternity benefit is granted under the National Insurance Act, but it is only obtainable after confinement. In very many cases the need for pecuniary help is greater in the pre-natal period and might sometimes enable the half-starved mother to produce a vigorous instead of a puny offspring. Grants of money for such special purposes are, however, only too apt to be misapplied. Expectant mothers are ignorant of their medical needs during pregnancy, but it has to be recognized that medical knowledge as to the exact physiological conditions prevailing as the pregnancy proceeds is insufficient, and pathological conditions likewise have not been fully worked out. Hence it is eminently desirable that laboratory study should form a part of every scheme, and that far more attention should be paid to the pathological evidence afforded by examination of the placenta, etc., than has been the practice hitherto.

Large numbers of babies are treated at general hospitals every year, and it is not gratifying to learn that in one representative institution the proportion of cases to which no real benefit could be afforded amounted to no less than 43 per cent.

Edinburgh is distinguished for the progress that has been made in dealing with tuberculosis at all stages, but it would seem that the amount of bone and gland disease in children is still excessive, and is attributed directly to the lack of proper control of the milk supply. The adult consumptive is provided for, as far as possible, and there are many institutions for convalescence for children, but it is obvious that the spread of the disease in one form or other is constantly going on, and must continue to do so among the infant population so long as the presence of tubercle bacilli in the feeding-bottle is ignored. Doubtless Edinburgh does not stand alone in this respect, and it will need much patient reiteration to induce the average mother to regard the bacillus as a more dangerous missile than the shrapnel bullet. The wound inflicted by the latter is often serious, but it is far less dangerous in its after-effects than the invisible, but none the less deadly, encroachments of the former.

At no period of life is the aid of the specialist more needed than in early infancy. The affections of the throat, teeth, eyes, and ears to which infants are subject have far-reaching effects in after-life if neglected. Hence the desirability of specialization in the treatment of babies as apart from children of school age. The establishment of fully-equipped babies' hospitals is urgently needed as a part of the whole plan for dealing with child welfare. The work of examination and treatment calls for much patience and perseverance on the part of doctors and nurses, and cannot be carried out satisfactorily in the general hospitals.

Apart from the treatment of actual disease there is also a vast field for advisory work in the patient's home. The detection of the first departure from health and the indications of oncoming illness can only be effected by a trained eye. Too often the stage of prevention has passed before the mother has found out that there is anything the matter. The services of health visitors with medical knowledge and experience must be enlisted in the carrying out of any complete scheme.

The whole subject is a very large one, and bristles with difficulties when practical measures have to be devised, but as regards the need for prompt and vigorous action there can be no difference of opinion.

[1] *Some Medical Aspects of Maternity and Child Welfare.* Papers read at the Edinburgh Pathological Club, introducing a discussion on the subject. Reprinted from the *Edinburgh Medical Journal*, May-June, 1917.

The papers contributed to the Edinburgh discussion will be found to present every aspect of the medical side of the problem, and deserve the careful attention of every one who may be charged with a share in the successful propagation of this much-needed reform.

SURGERY ON THE LINES OF COMMUNICATION.

To the Journal of June 2nd, 1917, Sir Anthony Bowlby and Colonel Cuthbert Wallace contributed an account of the development of British surgery in the front area of the Western campaign. This week Sir George Makins describes the corresponding progress of surgical opinion and practice within the great field of medical activity known as the lines of communication, of which Sir T. P. Woodhouse is the administrative head. These two illuminating articles between them cover that part of the surgical system which catches up the soldier wounded in Flemish or French battle line, and cares for him until he is returned fit to the front, or landed in this country for further treatment. The surgery that can be undertaken on the journey by ambulance train or barge, from the clearing station to an overseas base, is necessarily limited in scope, and Sir George Makins gives main attention to the lessons learnt in the wards and laboratories of the base hospitals, and to the current surgical procedure derived from them. In spite of the diverse views held by different surgeons upon many questions of wound treatment and operative technique, as we pass from details towards the broader issues of principle there are signs of general agreement. This, we believe, is largely due to the interchange of information as to results and methods between medical officers at the front and at the base, and between fellow workers in the same area; in this matter the consultants have played an important part by their personal influence, by their encouragement of the passage of brief case-records up and down the line, and by the stimulus they have given to the exchange of views at medical meetings in the various armies and bases. The chief difficulty has been to overcome that queer indifference of men labouring together in units not only to work of the same kind being done next door, but also to further stages of treatment in which they have had a hand—an attitude of mind partly due to the conditions of military life, and partly to human nature itself. The articles we are publishing will help to diffuse the knowledge which has been collected and tested by the most experienced observers, and will, we hope, break down what remains of the water-tight compartments separating bands of workers whose aim is identical.

HOUSING AND HEALTH REORGANIZATION.

Within the last month three deputations from organizations concerned with housing have waited upon the President of the Local Government Board, the last being one from the Workers' National Housing Council, which put before Lord Rhondda the point of view of the organized working classes with regard to the improvement and extension of industrial dwellings. As we have said with reiteration that may have seemed wearisome, the housing question is closely bound up with all measures for the betterment of the nation's health, and any scheme for consolidating the health activities of Government departments will fail if it is divorced from housing reform. Lord Rhondda, in his replies, showed that this is recognized by the department of which he is the head; and it seems likely that if his proposals for the establishment of a Ministry of Health are accepted by the Cabinet, the control of housing will be one of the functions of the new department. For the present, however, the important public announcement by the Government on the setting up of a Ministry of Health, which the newspapers heralded a fortnight ago, seems to have been postponed, possibly in consequence of representations from the approved societies under the Insurance Act. As we reported last week, the National Conference of Friendly Societies recently forwarded to the Prime Minister a memorial on this subject, urging him, among other things, to appoint an impartial committee to investigate the whole question before any decision is reached by the Government. To this a reply has been sent by Mr. Lloyd George to the effect that the memorial is now engaging his personal attention. It is further understood that the Prime Minister will shortly receive a deputation representing all the insurance organizations of the country to confer upon the matter. With this in view, friendly societies and allied bodies are holding meetings this week in order that their collective wishes may be laid officially before the Government. It is to be hoped that the views of the medical profession will receive at least equal consideration from the Prime Minister.

WELFARE WORK IN FACTORIES.

At a meeting of the Royal Institute of Public Health on June 6th, under the chairmanship of Dr. T. M. Legge, Mr. B. Seebohm Rowntree made a thoughtful contribution to a course of lectures on public health problems under war, and after-war, conditions. At this time of national stocktaking he wished to balance up that imponderable asset, the vitality of the nation as a whole. At any given moment on the credit side of the national life there was a certain amount of energy, staying power, and fitness—that is to say, so much health; on the debit side were all the conditions and forces tending to sap and squander health. The long roll of those poor creatures "physically unfit for any useful occupation" was not a mere deduction from the credit side, but must be placed on the debit side, since they used up the energies of the fit. Welfare work, continued Mr. Rowntree, was largely an attempt by employers of labour in their own sphere to increase the nation's asset of health, and to remedy leakage, breakage, and waste of vitality. The first aim should be a satisfactory wage level, not only covering the bare demands of physical efficiency, but giving a substantial margin for the amenities which add to health and happiness. Effort must be correlated with capacity, and hours of work must not be so long as to overtax health, since a man starved of rest is no better off than a man starved of food. Another task of the welfare worker is to give watchful care to hygienic conditions, to organize recreative facilities, and to promote social schemes generally, on a self-supporting basis. Lastly, the welfare movement aims at arousing a spirit of co-operation and goodwill pervading the whole factory, and touching each individual. Taking a comprehensive view, Mr. Rowntree realizes that an unredressed grievance, however trivial, is a focus of irritation in the industrial body, detrimental to its health. "Contentment, on the other hand, is a very great physician. His fees are high, but we cannot afford to dispense with him."

RUSSIAN PRISONERS IN GERMANY.

In an article published in the *Revue des Deux Mondes* of March 15th a French lady, who signs herself "Marylie Markovitch," gives an account of a visit she paid in the summer of 1916 to the military convalescent hospitals in the Crimea. In what was then known as the Alexandra Feodorovna Sanatorium at Massandra, near Livadia, she came across a young officer, Henry Sienkiewicz, a nephew of the famous author of *Quo Vadis?* His statements may be added to the large body of personal testimony to the brutality of the Germans towards the prisoners of war in their hands which have already been published in the Journal. He was a captive in Germany for fourteen months in conditions which he described as terrible. He had received two bullet wounds in the leg besides a severe contusion on the head, and was left for dead on the field. He was brought back to consciousness by a sharp pain in the arm caused by a bayonet thrust,

and was horrified to see German soldiers dealing with all the Russians in the same way to make sure there were no wounded overlooked among the dead. He was picked up by stretcher-bearers, and thought he was being carried to an ambulance, but he was thrown into a stable with other wounded men. There they remained four days, untended, without food, and tortured by thirst and fever. Many of them died of gangrene; the guards did not trouble to remove the bodies. The air already polluted became irrespirable, the only ventilation being through holes in the walls. Luckily Sienkiewicz had kept his emergency dressing and some iodine and this saved his life. At last the prisoners were removed to the hospital of Ostrakno. The Germans kept such dressings as they had for their own wounded and treated the Russians with morphine. Owing to this, almost all the soldiers and officers sent back from Germany are morphinomaniacs. Even in hospitals in the early months of the war food was insufficient. Later, especially in the internment camps, it became uneatable and the men died of starvation. Sienkiewicz maintained that everything that had been said on this subject was short of the truth. Of the prisoners, those most to be pitied were the poor Russian *moujiks*, whose wives generally could not read or write and whose homes were scattered throughout the vast Steppes of the East. No letter or parcel ever came to them. When they had eaten their meagre ration, they would devour the most disgusting offal. Whatever his resignation, his readiness to forgive injuries, his simple faith, the Russian peasant will long remember the German prisons. Captive officers are spared no kind of insult or ill treatment. Sienkiewicz was made to spend four weeks among lunatics. For refusing to remove his epaulettes he was sent to a soldiers' camp where bodily punishments were inflicted with a savagery which caused new, and sometimes irreparable, injury to weakened constitutions. He was finally transferred to the Stralsund Hospital, where the treatment was slightly better. The worst example of cruelty he saw was the treatment to which a brother officer, Captain Fomine, was subjected. He had fourteen wounds, hardly dressed, and suffered so acutely from the jolting of a railway carriage that he could not restrain his cries. For this a German soldier took him up bodily and threw him out of the moving train. By a miracle he was not killed. He rolled down the embankment on to a road, where the passers-by recognizing him for a Russian yelled abuse, showered blows upon him, and pelted him with stones. A kind-hearted peasant picked him up and saved his life.

CONGENITAL TUBERCULOSIS.

GENUINE cases of congenital tuberculosis in human beings are undoubtedly very rare. Indeed, two French authors, after an exhaustive analysis of the available literature, came to the conclusion in 1915 that only fifty-one conclusively genuine instances of it had then been published. The subject is reviewed in an interesting article[1] by Dr. F. Parkes Weber, who points out that while the infection of the fetus in these rare cases has been generally thought to have occurred only when the mother was in an advanced stage of tuberculosis and probably suffering from generalization of the disease, it may in fact occur when the mother's tuberculosis is not far advanced, or is even quiescent. In few, if any, of these instances does direct paternal infection seem to have been concerned, although such seminal infection is undoubtedly possible. Dr. Parkes Weber shows that the tubercle bacilli can pass from the mother to the fetus in various ways. No doubt the infection most commonly takes place by way of the placenta, in which tuberculous changes may be present yet extraordinarily hard to demonstrate; Schmorl even speaks of examining as many as 20,000 microscopic sections of a placenta before the tuberculous lesions present in it could actually be demonstrated. In such examples of placental infection the tubercle bacilli might be supposed to "grow through" the placenta into the fetal circulation; or else, perhaps, to be forced from the placenta into the fetal circulation by the uterine contractions during labour. Two other possible methods of infection were suggested by Sitzenfrey in 1909. One is that chronic venous engorgement of the villous capillaries might lead to their rupture into the maternal intervillous spaces. Should this occur, maternal blood containing tubercle bacilli might gain entry into the fetal circulation. The second of Sitzenfrey's suggestions is that tuberculous foci situated in the decidua vera may penetrate the amnion, infecting the liquor amnii and so the fetus. Dr. F. W. Andrewes had already, in 1903, put forward the view that prenatal tuberculosis might possibly be caused by the fetal ingestion of amniotic fluid containing tubercle bacilli derived from a disintegrating tuberculous lesion of the placenta. It may be added that the literature contains records of a few instances in which miliary tuberculosis of the placenta has occurred in mothers with latent tuberculosis. These would no doubt be explained by the occurrence of a temporary tuberculous bacillaemia from which the mothers made good recoveries.

[1] *British Journal of Children's Diseases*, London, 1916, xii, 321, 359.

EYES AND NO EYES.

IT is to be hoped that in the years to come it will never again happen that industries providing materials which are directly, or indirectly, essential to the practice of medicine are allowed to languish and die out in this country. Instances which strike the mind at once are the manufacture of many kinds of scientific apparatus, and the synthetic drug industry, both of which had so largely passed into the hands of firms in foreign countries, that the outbreak of war found us cut off from almost every source of supply. The result has been a dangerous shortage of instruments, chemicals, and appliances indispensable alike in research, in diagnosis, and in therapeutics. British firms have done, and are doing, their best to cope with this situation in the midst of the war, but the heavy and increasing demands of the army are always ahead of the supply. One after another the available stocks of articles needed for medical practice are being, so to speak, called up to the colours or passed into the army reserve. A new department of Technical Optics in connexion with the Imperial College of Science and Technology is now being organized by a committee having representatives on it of the Admiralty, the Army Council, the Ministry of Munitions, the Royal Society, the National Physical Laboratory, employers in the optical and glass-making trades, and elected representatives of glass workers and metal workers. Mr. Frederic J. Cheshire, President of the Optical Society, formerly of the optical department of the Patent Office, and recently technical director of the optical department of that Ministry, is to occupy the office of director under the committee, and also to be professor of technical optics at the Imperial College. The professed object of this important new department is to co-ordinate the optical industry on national lines. The scheme began with the London County Council, but the Government is granting £5,000 for equipment and £4,000 a year for working expenses, and it appears that scientific research and technical education will both be undertaken. There is a great deal of scope for the work of this committee not only directly in matters concerning the production of optical instruments, but also for glass appliances required for scientific research and in medical treatment. With regard to the use of glass apparatus in research laboratories we need not say anything, for the need must be recognized by everybody who has ever entered a laboratory, but it is possible that the demands of medical practice may not be fully realized. There is, for instance, the question of the supply of thermometers and syringes for

the administration of drugs and vaccines. Further, there is the relatively minor matter of the supply of artificial eyes. There is a constant demand for artificial eyes both for civilians and soldiers. Only last week we recorded the issue of an order requiring persons engaged in the manufacture, purchase, or sale of artificial human eyes to make a return of stocks and materials within seven days to the Director of Optical Munitions. An artificial eye—contrary, perhaps, to public belief—is not a mere luxury used only for cosmetic purposes; it is often needed as part of the ophthalmic surgeon's treatment of the case. All will agree that the soldier who has lost an eye in the service of his country must come before the one-eyed civilian, but the latter must not be allowed to go short. Before the war, we understand that the manufacture of artificial eyes in this country was limited to a very few small firms, and that the great bulk of the supply came from Germany. Vendors in the early days of the war held good stocks, mostly of German make, but these, we believe, are now almost depleted. The recent order of the Ministry of Munitions, unless something is done to stimulate the home production, will, we fear, have the effect of cutting off the civilian supply. This is a matter which should receive attention from the new department.

THE CAVENDISH LECTURE.

THE President and Council of the West London Medico-Chirurgical Society, wishing to pay a compliment to the medical services of the overseas forces, invited Captain Andrew Macphail, M.D., C.A.M.C., the distinguished Professor of History of Medicine in McGill University, Montreal, to be the Cavendish Lecturer for the present year. The lecture will be delivered at the West London Hospital on Friday, June 22nd, at 8.15 p.m., and Captain Macphail has chosen as his subject "A Day's Work." Representatives of the medical services of all the overseas forces will be present, and it is hoped there will be a large attendance on this occasion, which is a notable departure from precedent. Invitation cards to the lecture and conversazione may be had on application to Dr. Reginald Morton, 66, Harley Street, W. 1.

Medical Notes in Parliament.

Medical Arrangements in Mesopotamia.—In a written reply to a question by Sir J. Jardine as to the health of troops in garrisons on the rivers Tigris and Euphrates, the provision of hospitals and the supply of nurses at Basra, Baghdad, Amara, and Nasiriya, and the supply of fresh vegetables, the Under Secretary of State for War said that the general health of the whole British Forces in Mesopotamia was satisfactory. There was an ample supply of hospitals and no deficiency of nurses had been reported. The ratio of admission to hospital was less than double that of the troops in India in peace time. The death-rate for all causes other than wounds in action was 4.5 per 1,000 per annum, which was only fractionally higher than the peace rate in India. Owing to the arrangements made to induce local cultivators to grow crops under our control, it was reported that full and varied supplies of vegetables could now be obtained throughout the year at all the principal centres.

Pensions Appeal Committee.—Sir A. Griffith-Boscawen stated, on June 11th, that the Committee who are to hear appeals in pension cases will be constituted as follows:

His Honour Judge Parry.
Lieutenant-General Sir A. E. Codrington (representing the War Office).
Admiral Sir Wilmot Fawkes (representing the Admiralty).
Dr. Norman Moore (Royal College of Physicians).
Mr. Bilton Pollard (Royal College of Surgeons).
Mr. A. Bellamy (Railwaymen Union).

Artificial Limbs.—In reply to a question by Mr. W. Thorne, on June 12th, the Parliamentary Secretary to the Ministry of Munitions said that under the Workmen's Compensation Act there was no obligation on the employer to provide artificial substitutes for munition workers who suffered the loss of a limb. In the case of workers in the direct employ of the Ministry an artificial substitute was provided free of charge.

Prisoners of War.—On June 12th, in reply to Mr. G. Faber, Mr. James Hope said that the number of British combatant prisoners of war in the Regular and Territorial forces, Royal Naval Division, and Indian forces was as follows:

	Officers.	Other Ranks.
Germany	1,354	34,304
Turkey	556	8,355
Austria	5	12
Bulgaria	22	523
	1,937	43,194

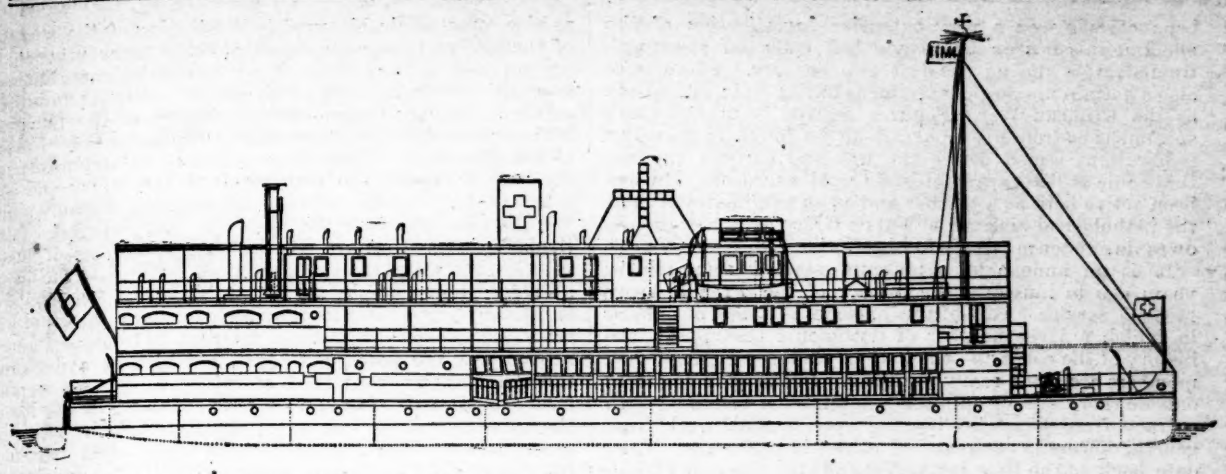
The German figures included a certain number of prisoners taken in East Africa, and he believed that the great majority of prisoners in Turkish hands were native Indians.

Flavine.—On June 8th General Croft asked two questions with regard to flavine, inquiring whether its properties were known to the medical profession in January last through a preliminary report published in the BRITISH MEDICAL JOURNAL; whether hitherto substantial quantities could not be obtained for the treatment of wounded soldiers at home or abroad; what steps the War Office had taken to obtain it; and whether there had been delay in the execution of any order given. The Under Secretary of State for War said that the preliminary report gave the results of experiments with a small supply of flavine, a complex substance specially made for those experimental purposes in a Government laboratory. Arrangements were made at the time for further trials in various military and other hospitals, and steps taken to arrange for a commercial supply being rendered available in the event of these trials proving sufficiently favourable. The trials had been in progress since January, and the effects so far obtained were under careful comparison with those of other antiseptics. It was necessary to obtain a licence from the Board of Trade before the substance could be placed on the market, as it was already the subject of a patent obtained before the war. In the middle of May applications were made to the Board of Trade by various firms, and the hearing took place on May 24th. The requisite licences were now being issued to five firms, and there would seem to be no doubt that the substance would be supplied as rapidly as the several firms could produce it. He hoped it would be available in the near future.

The Passing of Unfit Men.—A large number of questions have recently been addressed to the Under Secretary for War as to the re-examination of recruits and the passing of unfit men. The questions referred to incidents stated to have occurred at Hulme Town Hall, Salford, Hyde, Ulverston, Northampton, Leicester, and other places. Mr. Macpherson indicated in his replies that all the complaints were being carefully investigated. The instruction was that men suffering from definite disabilities which incapacitated them from general service were to be classified in the lower categories for service of an auxiliary character. Every effort was made not to accept for service men with disabilities of such a character as to unfit them for rendering military service either of a general or auxiliary character.

Osteopaths.—In reply to Sir George Greenwood, who appeared anxious that American osteopathic doctors should be allowed to treat British soldiers in France and the British Isles, Mr. Macpherson replied that a large number of doctors commissioned in the army of the United States had been sent to Europe, and many of the most eminent practitioners in the United States were included. The American Government had commissioned the officers sent, and it was not proposed to look for any other security that these officers were qualified for the duties assigned to them.

Artificial Limbs for Invalided Soldiers.—Replying to Major Chapple, who asked whether it would be more conducive to economy and efficiency for the State to undertake the manufacture of artificial limbs for soldiers, instead of obtaining them from private firms, Sir A. Griffith-Boscawen said that the Pensions Ministry would not hesitate to adopt the former alternative if there was reason to suppose that the prices charged by the private firms were considerably in excess of the intrinsic value of the limbs. He accepted as approximately correct figures by Major Chapple—namely, that 8,805 artificial limbs had been made for our soldiers by private firms at a cost of £127,293, and that over 7,000 men who had already lost their limbs had still to be supplied. He agreed also that the cost of renewals and repairs would recur.



THE WAR.

HOSPITAL SHIPS FOR THE TIGRIS.

ON June 9th a representative of the JOURNAL was given an opportunity, through the courtesy of the Inland Waterways and Docks Department, of inspecting one of the river hospital ships which have been built in this country for service on the Tigris for the benefit of the sick and wounded in the Mesopotamia campaign. This type of vessel is the outcome of a great deal of thought, and of first-hand knowledge of the actual conditions under which it will work. It is specifically designed for the carrying of wounded and sick men from the upper reaches of the River Tigris to the main base at Basra; for this the draught must not exceed 3 ft. 6 in. The length of the vessel and the kind of steering control are also limited by the sharp bends in the river to be navigated, and the restriction of length has necessitated a beam limit in order to give the required displacement. The speed of eight knots is obtained by oil fuel motor engines operating twin screw propellers, thus saving weight and simplifying the fuel problem. The longitudinal section, which we reproduce, shows that the vessel consists of hold, main deck, upper deck, and flying deck, with a light sun deck fitted over the last named. Temporary strengthening for the outward voyage to the East has been provided, as the whole of the structure has been made as light as possible consistent with strength. Steam auxiliary power is given by an oil fuel water-tube boiler, which works the main steering gear, windlass, evaporating apparatus for fresh water supply, and a calorifier for hot water supply. A very complete system of ventilation on the thermo-tank principle gives a continuous supply of fresh air by means of large electrical centrifugal fans and trunks; in the severe cold of a Mesopotamian winter this air is heated by steam; for the extreme heat of summer there is a very liberal supply of smaller electric fans throughout the ship. An ice-making plant with ice store and meat room is provided, and in the same compartment there is a soda water machine.

The main and upper decks are arranged as hospital wards for either European or Indian troops. Some of the cots are grouped in two tiers, the rest are long and wide fracture cots, all arranged to give free access to the patient. The flying deck is for convalescents. The sides of the lower wards are specially designed to exclude cold and rain in winter, and to allow the freest play of air in the summer heat, with the minimum of flies and direct sunshine. At the fore end of the upper ward is an excellent operating theatre, well lit and fully equipped; with a preparation and sterilizing room adjoining. Each ward has also its own complete minor surgical outfit.

Much care has been spent upon the officers' and sisters' quarters, which are very neatly and compactly furnished. Baths, lavatories, etc., are generously provided through the ship. The principal medical officer's cabin is fitted as combined cabin, office, and laboratory. The dispensary is extremely well stocked with every drug likely to be needed in the climate. The commissariat arrangements are well thought out, and besides bakery, butcher's shop, and washhouses, there are separate galleys and pantries for British patients and for each of the different castes of Indian sick and wounded. The water supply is abundant and accessible, and can be maintained by the distilling plant already mentioned. A noteworthy point is that the sanitary arrangements are all on the opposite side of the vessel to the food stores and cooking apparatus, with a longitudinal screen between them to discourage flies. Patients can be loaded from either side of the two ward decks, with ample room for the passage of serious fracture cases, while a cot lift plies between the two decks.

Careful inspection of the ship under the guidance of Lieut.-Colonel R. M. Carter, I.M.S., who has had much to do with its planning, gave the impression that everything in the way of design and equipment has been done to secure the comfort and welfare of the sick and wounded on their long journey from the Tigris front to the base. Only intimate knowledge of the actual conditions, and unremitting attention to details, could have produced so excellent a result. Since the early disastrous months of the Mesopotamian campaign, as Sir Arthur Lawley's report has already indicated,[1] a new breath of energy and efficiency has passed through all medical arrangements. The appalling wastage of life and health due to preventable causes has been checked. River hospital ships of the class now being supplied must prove an important factor in the medical situation on this front, and their design will serve as a type for future construction.

In Lieut.-General Sir Percy Lake's dispatch dealing with the period January 19th to April 30th, 1916, he stated that the first river hospital ship *Sikkim* arrived in February. This fact was underlined, as it were, by Sir Victor Horsley, who in one of the last letters written before his death wrote: "There never (until March, when our solitary hospital steamer arrived) has been any medical transport whatever; nothing but the foulest store barges and steamers used on their return journey to the base to carry the sick and wounded."

The King visited the new vessel on June 5th, and, after close investigation of all its features, expressed himself in the warmest terms of appreciation.

THE FRENCH ARMY MEDICAL MUSEUM.

A LITTLE over a year ago, under an order of the Under Secretary of State (sanitary) of the French War Office, a collection of specimens illustrative of military medicine and surgery in this war was instituted at the Ecole d'Application du Service de Santé Militaire at Val de Grâce. It has been visited by many British surgeons passing through Paris and has excited a good deal of interest.

There had long been in that institution a collection of specimens chiefly illustrating injuries to bone formed by M. E. Delorme, who only a few months ago retired from his position as one of the three medical inspector-generals of the French army. For many years he had

[1] BRITISH MEDICAL JOURNAL, May 5th, 1917, p. 595.

been carrying on a very extensive investigation of the effect of missiles on bones, and had collected specimens from all wars during the last two decades. There were also a certain number of specimens dating from as far back as the Crimean War. Pictures derived from Delorme's specimens or from his books are to be found in so many publications issued before the war and early in the war that some at least are familiar to most surgeons. He has been active both as a teacher and as an administrator, and the pathological museum at Val de Grâce as it now stands owes its existence largely to his efforts.

It is an annexe to a museum started some thirty years ago to illustrate the history of the French Army Medical Service. Part of this museum is a kind of library in which a large number of documents bearing on the history of the corps and the lives of its more distinguished members are made easily available. In the open corridors outside there are in addition many tablets inscribed with extracts from dispatches bearing upon medical work from general officers in command of armies in past wars. They date back to the time just before and after the first French Revolution, about 125 years ago. Among other things the inscriptions indicate that the French Army Service de Santé Militaire was first organized very early in the eighteenth century, and that in the third year of the great Revolution, some eighty-two years later—that is to say about 1794—the Convention decreed that Val de Grâce, until recently a monastery but now a military hospital, should also be used as a place of instruction for army surgeons. The Committee of Public Safety in the following year extended this order by making it what it now is, the finishing school of officers and pharmacists admitted to the Service de Santé, and a place devoted to the study of the technique of the work of the corps, in relation to the collection, the evacuation, and the treatment of the sick and wounded.

The school portion of the buildings occupies a relatively small space; the hospital portion is large, being distributed through a number of buildings round a very large central garden. Some of these buildings are new, many are very old so far as their main structure is concerned. Medical men and pharmacists, before coming to this school where they are supposed to spend a year, must have obtained their state diplomas by studying for the ordinary five and four year periods at the medical school at Lyons. Part of this school is solely for future army medical officers, who gain admission by competitive examination, and receive education practically free.

Among the inscriptions in the corridor are many recording the names of army medical officers who died from sickness or were killed in action or died from wounds in past wars. Judging from these the losses must always have been heavy; for instance, one tablet shows that there were over 600 deaths in the field in the first eighteen months after the establishment of the first Republic, and the names on another tablet relating to an outbreak of yellow fever in San Domingo in 1800 number between 120 and 140, exclusive of pharmacists. Another interesting point made clear by the inscriptions is that the French Army Medical Corps won official recognition and received expressions of public gratitude at a very early date. For instance, Percy, Larrey, and Desgenettes were all made Barons of the Empire by Napoleon, as also Commanders of the Legion of Honour on its establishment, and their names were inscribed on the Arc de Triomphe.

At the present time the principal contents of the main museum, apart from archives and pictures, are clay models of regimental aid posts and dressing stations used in this war, and model plans of various hospitals so arranged as to illustrate the method of their working. There are also a very large number of specimens illustrative of the technical work of hospitals; a large proportion are models, but others are specimens of the apparatus itself. They include stretchers of all kinds, splints and irrigation appliances, and models of hospital trains. The models relating to medical trench work are from all points of view admirable, but not so much can be said for the rest. The collection no doubt has a certain historical interest, but is not in all respects thoroughly representative and illustrative of actual medical and surgical ideas at the present time.

In the pathological portion of the museum a large, perhaps the major, portion of the specimens now on view were got together in the first few months of the war by telling off one or two medical officers specially for this purpose. But there are many other specimens in addition, as also some admirable models illustrative of the surgery of the face and the appearance of limbs after injuries of nerves, and a few relating to conditions intentionally brought about by men desirous of escaping military service. Perhaps the outstanding feature of the museum is the care and completeness of the documentation of most of the specimens. They show precisely for the most part the way in which the man received the injury and the interval that elapsed between the moment of the wound and the time at which the specimen was prepared. Particularly interesting are some of the specimens of head injuries, the scalp, the skull, the dura mater, and the brain all being shown side by side. All the bone specimens are excellently prepared, and they include many which illustrate the capacity of modern missiles to fracture a bone, not only at the point of impact, but also at a distance therefrom. The same kind of injury in organs is also freely illustrated—that is to say, the splitting of the liver, the kidneys, and the spleen, etc., by the explosive effect of a missile which has hit the body in some other part but has not actually come into contact with the organ injured. These specimens of soft organs resemble for the most part those familiar in museums of ten years ago—that is to say, they have not been preserved in such fashion as to retain their colour. An endeavour to do the latter is a feature of British work in the same direction; no doubt the French workers before the war is over will have plenty of specimens of this more attractive kind. Retention of colour in pathological specimens is one of the many means by which the path of the modern medical student is smoothed.

CASUALTIES IN THE MEDICAL SERVICES.

ARMY.

Drowned.

CAPTAIN J. GIBSON, LATE C.A.M.C.

Captain John Gibson, late of the Canadian Army Medical Corps, was drowned recently while bathing at Sandycove, near Dublin.

Wounded.

Colonel F. S. L. Ford, Canadian A.M.C.
Lieutenant-Colonel C. P. Templeton, Canadian A.M.C.
Captain F. P. Fisher, R.A.M.C. (temporary).
Captain S. S. Greaves, R.A.M.C.(T.F.).
Captain A. Kidd, New Zealand Medical Corps.
Captain A. G. M. Middleton, R.A.M.C. (temporary).
Captain B. C. Tennent, R.A.M.C. (temporary).

DEATHS AMONG SONS OF MEDICAL MEN.

Dockrell, Herbert Morgan, Lance-Corporal Duke of Cornwall's Light Infantry, youngest son of Dr. Morgan Dockrell, London, W., killed April 23rd. He held a commission as lieutenant in the Cork Royal Garrison Artillery (Special Reserve), and at the beginning of the war got a similar commission in the Royal Field Artillery, which he resigned on account of ill health in February, 1915. Having improved in health, he enlisted in the Duke of Cornwall's Light Infantry in December, 1915. He had previously been wounded.

Fleming, David, Private Light Trench Mortar Battery, A.I.F., youngest son of the late Brigade Surgeon Joseph Macnaughton Fleming, I.M.S., killed May 8th.

Hamilton, Ronald M., Second Lieutenant Cheshire Regiment, fifth son of Dr. Hamilton, late of Chester, accidentally killed abroad June 3rd.

Shirlaw, Ninian F., Captain Argyll and Sutherland Highlanders, eldest son of Dr. Shirlaw, of Montpelier Park, killed May 16th, aged 22.

Sutcliffe, F. Malcolm, Second Lieutenant London Regiment, third son of the late Dr. Sutcliffe, of Clapham, killed May 29th. He joined the Inns of Court O.T.C. in November, 1915, and, after getting his commission, went to the front last March. Two of his brothers are serving in France.

NOTES.

SURGEON-GENERAL G. CARLETON JONES, Canadian Medical Commissioner, who has been in Canada for the last few months, has returned to this country.

QUEEN ALEXANDRA'S HOSPITAL FOR OFFICERS: OPENING OF ANNEXE.

An annexe to Queen Alexandra's Hospital for Officers at Highgate Hill has been opened, through the generosity of Mr. S. J. Waring, at 25, Portland Place for the reception of partially convalescent or less seriously wounded officers. It contains 12 beds, with an allowance of 1,200 cubic feet of air and 88 square feet of floor space for each.

All these beds are in the front and back drawing-rooms on the first floor, and in addition to ample accommodation for the nursing and domestic staff, there are sitting and writing rooms for the use of patients and a winter garden. On June 7th Mr. Waring formally handed over the house to Sir Alfred Mond, Chairman of the Queen Alexandra Hospital Committee, and Sir Alfred Keogh in declaring it open said that Queen Alexandra's Hospital for Officers, which was one of the earliest to be opened in this country, had a surprisingly good record. Among the nearly 500 cases admitted to the hospital during the last two years, the total number of deaths had been only four, and this low mortality was all the more remarkable when the rather exceptional severity of the cases which had been dealt with was considered. It was a useful fact to remember, and one which was new to him, that anaesthetics were borne with much greater ease in the country and in such places as Highgate and Hampstead than in the city hospitals. It was explained by the influence of the fresh air on the condition of the patients after administration. The report of the honorary surgeon-in-charge, Mr. Herbert J. Paterson, was to the effect that there was a slighter post-operative rise of temperature and a greater freedom from bronchial irritation as compared with the effects of similar anaesthetics administered in a London hospital. Sir Alfred Keogh said that he had been criticized for retaining small hospitals in view of their admitted wastefulness in effort, money, and staff; but they had the virtue of enabling generous citizens to render valuable help in the care of the wounded, and to get rid of them ruthlessly, even if sufficient larger hospitals were available, would be something of a catastrophe.

Scotland.

THE Glasgow University Court, at its meeting on June 7th, had before it answers from the Senate to questions regarding a proposed age limit for principals and professors. The questions were drawn up at the instance of a joint conference of representatives of the courts of the four Scottish universities, and the replies of the Glasgow Senate will be sent to this conference. The Principal stated, in reply to a question, that legislation would be necessary to give effect to any such scheme.

EDINBURGH SCHEME FOR DEAF SOLDIERS.

Hitherto the cause of the soldier deafened in his country's service has scarcely received the sympathy and public attention which it deserves. In this matter, as in many others, Scotland has given a lead. The Edinburgh Lip-Reading Association, finding that little was being done for the thousand soldiers discharged up to a year ago through Chelsea, with damaged powers of hearing, took up the matter and raised funds. The Edinburgh School Board agreed to supply class-rooms and teachers, while the association undertook the care of the men during their period of training. The first session of six weeks' instruction organized by the association lately came to a close, when the class was inspected by the Marquis of Graham. It is to be hoped that this valuable work will be undertaken in other centres without delay, so that the deaf soldier may no longer feel that he is "nobody's child."

THE ERSKINE HOSPITAL FOR LIMBLESS MEN.

The West of Scotland hospital for sailors and soldiers who have lost their limbs, the organization of which during the last year has been mentioned from time to time in these columns, was formally opened by H.R.H. Princess Louise, Duchess of Argyll, on June 6th. It is established in Erskine House, the grounds of which go down to the banks of the Clyde. Sir William Macewen, C.B., in a statement regarding the scope of the hospital, said that the aims of the Executive Committee were (1) to secure and maintain a hospital in Scotland for the care and treatment of limbless sailors and soldiers; (2) to manufacture and supply them with artificial limbs; (3) to train the limbless in the use of their artificial appliances and to give them facilities for learning trades suitable to their altered condition; and (4) generally to aid in restoring them to their place as effectives in the industrial army of the nation. The house itself provided 200 beds besides accommodation for the staff, but the total number of beds had been increased to 400 by the erection of temporary pavilions. A committee composed of expert engineers and surgeons had made arrangements for the construction, standardization, and improvement of artificial limbs, which were made of the finest wood, Scottish willow, the toughest steel, and the best leather. The committee had been able to bring about a marked reduction in the prices hitherto paid, but there was a good deal more to be done, especially in regard to artificial arms, which, as supplied by competing firms of limb makers, were far from perfect. A scheme had been adopted to establish a research workshop or laboratory to which skilled artificers would be appointed. For this purpose a separate fund had been raised, to which a contribution of £2,000 and another of £300 had already been made. The workshops, though still in the initial stage, had produced very satisfactory results, and it was hoped by keeping in touch with various trades to draft workers straight from Erskine into paid positions. Sir William Macewen concluded by paying a generous tribute to the hospital staff and to all who had co-operated in the undertaking.

CONTROL OF VENEREAL DISEASES.

On June 1st a conference on the control of venereal diseases was held under the auspices of the Edinburgh Public Health Committee. Sir Malcolm Morris, chairman of the Propaganda Committee of the National Union for Combating Venereal Diseases, the presidents of the Royal Colleges of Surgeons and Physicians of Edinburgh, and a representative from the Royal Infirmary, took part in the proceedings. The Edinburgh Corporation has now in preparation a scheme in accordance with the order issued last October by the Local Government Board for Scotland, to which reference was made in this column last week.

MATERNITY AND CHILD WELFARE EXHIBITION IN EDINBURGH AND LEITH.

The Scottish Travelling Exhibition of Maternity and Child Welfare Work, Food Values, Housewifery, and Thrift was on view in the Synod Hall, Edinburgh, during the last week of May. This exhibition, prepared and conducted under the Maternity and Child Welfare Committee of the Scottish Union of Women Workers, has already done good service in popularizing the campaign against infantile mortality due to ignorance of hygiene in various parts of Scotland. The civic authorities and several members of the medical profession—including Sir Halliday Croom, Sir Robert Philip, and Dr. J. W. Ballantyne—took part in the proceedings, and the attendance, especially in the evenings, was very good. The same exhibition visited Leith, and was on view in the Assembly Rooms there between June 6th and 9th. Again a large share of the speaking was done by doctors—Mrs. Elder, M.B., Mrs. Grace Dundas, D.P.H., Dr. Ballantyne and others taking part either in the opening ceremonies or the evening lectures. Many of the exhibits made a strong appeal to the eye on behalf of healthier homes, feeding, and hygiene, and the element of humour was not lacking "to point a moral or adorn a tale."

MEDICAL NEEDS OF THE ARMY.

At a recent meeting of the Caithness and Sutherland Local Medical War Committee the position which would arise if more medical men of military age in the area were called up was discussed. Owing to the wide area covered by the remaining practitioners under 41, and the badness of the roads, it was considered that most of them could only be released for service by a system of substitution, since it would be impossible for neighbouring practitioners to do the work. As, however, the needs of the wounded were the first consideration, the committee warned the public that considerable sacrifices would have to be made; they would have to do with less medical attention and to be more reasonable in their demands on the doctors left behind if more calls were made for military service upon the medical men of the two northern counties. The meeting unanimously resolved that the time had come when every fit man in the medical profession in Scotland, irrespective of age, should be conscripted and his services placed at the disposal of the Scottish Medical Service Emergency Committee, thus making possible a scheme of redistribution of doctors whereby more men of military age could be released for the army.

Ireland.

TUBERCULOSIS IN ANTRIM.

DR. TURKINGTON, Tuberculosis Medical Officer for County Antrim, in his report to the county council, states that the number of applications for sanatorium benefit received by the County Antrim Insurance Committee during the year was 180, a number which would doubtless have been much larger had it not been for the fact that the Committee was obliged, for financial reasons, to suspend the treatment of "surgical" cases of tuberculosis early in the year. Of the 180 cases, treatment was refused to 32; sanatorium benefit was granted to 31 patients (17 men and 14 women). The cases sent to the sanatorium were either (*a*) incipient cases or (*b*) persons who resided in crowded cottages and were likely to infect others. While anything but temporary arrest of the disease was not to be hoped for in the latter cases, the committee felt that a short educational course in the sanatorium might be of value to teach these patients how best to live without being harmful to their neighbours. The results of sanatorium treatment were: Discharged much improved, 12; discharged, no improvement, 3; left contrary to medical advice, 3; died in sanatorium, 1; remaining in sanatorium, January 1st, 1917, 12. Domiciliary treatment, which was granted to 117 patients, has proved rather expensive, and an attempt was made during the year to substitute monthly for weekly visits where possible. This system will probably be widely extended during 1917, and it is probable that domiciliary treatment in the urban areas of Ballymena and Lisburn will be almost altogether replaced by dispensary treatment. Of the 180 cases, 123 (or 68.3 per cent.) occurred under 30 years of age. A great proportion of these cases were young girls, workers in various factories exposed to dusty atmospheres and frequent changes of temperature, and accustomed to live on a very insufficient diet, largely consisting of tea. The more elderly cases were generally, if males, of the farm labouring class; or, if females, of the middle-age mill-operative class, broken down by the attempt to do housework and millwork at the same time.

England and Wales.

MATERNITY AND CHILD WELFARE.

THE Local Government Board has published a report on the provision made by public health authorities and voluntary agencies in England and Wales for maternity and child welfare.[1] The report summarizes the arrangements made in each sanitary district for the promotion of the health and physical welfare of expectant and nursing mothers, and of infants and children under school age. At the present time all the 29 metropolitan boroughs except Camberwell, all the 82 county boroughs except Gateshead, 51 of the 61 county councils outside London, and 360 county districts have made some provision for health visiting. Most of these authorities have also established maternity and child welfare centres, or have made use of centres set up by voluntary effort. The number of voluntary societies engaged in maternity and child welfare work mentioned in the report is 321. It is pointed out that the co-operation between a local authority which is carrying out a scheme and the voluntary agencies working in its districts must be as close as possible if the full value of the voluntary effort is to be obtained. A great deal has already been accomplished, but much still remains to be done. More centres are needed and a large addition to the staff of health visitors. Competent midwives should be provided throughout the country, the report adds, and their services should be free to all women who cannot afford to pay; and a medical service for giving aid when this is necessary during the confinement should also be secured.

BABY WEEK.

The National Baby Week Council, 6, Holles Street, Oxford Street, W., has been actively at work during the past few weeks in preparation for the National Baby Week, which, as already announced, will be held from July 1st to the 7th. The programme includes the representation of a film entitled "Motherhood," designed by Mrs. H. B. Irving, who, with the Mayor of St. Pancras, has arranged a pageant and procession for St. Pancras, St. Marylebone, Hampstead, and Paddington, on Thursday, July 5th, concluding with a garden party at the Botanic Gardens. Courses of lectures for prospective speakers during the week are now being given at the College of Ambulance, 3, Vere Street, W., and elsewhere. It is hoped that upon the foundation of these seven days' activity, a great and permanent national movement will be organized to awaken the public to the dignity of motherhood and the rights of the child.

The standing joint committee of all industrial women's organizations on June 5th forwarded a resolution to the National Baby Week Council, asking it to consider the possibility of bringing forward proposals to make it compulsory on the public health authorities to establish maternity committees and adopt schemes providing for the health of mothers before, at, and after confinement, and for children up to school age. The committee recommends also that a Ministry of Health, based on the public health work of the Local Government Board, with a maternity department partly staffed by women, should be immediately created, and that local health authorities should be empowered to supply pure milk at a cost within the reach of all classes.

EMERGENCY SURGICAL AID CORPS.

Previous references have been made in the JOURNAL to the establishment, in November, 1914, of an Emergency Surgical Aid Corps for London, with head quarters at the house of the Royal Society of Medicine, No. 1, Wimpole Street. At the annual meeting, which was held early this year, the chairman, Sir Rickman Godlee, reported on the work carried out between October, 1915, and January, 1917. Twelve calls were received, including a summons to the scene of the explosion on January 19th; more than a hundred members responded, and fifty-three were sent to the scene of the disaster. A naval section has been formed, consisting of twelve chief surgeons, forty-three surgeons, and thirteen anaesthetists, ready to answer any call the Admiralty might make. The chairman pointed out that further funds were needed in order to carry on the organization, and appreciative speeches were made by Sir Arthur M..y, on behalf of the Medical Department R.N., by Sir Thomas Gallwey, D.M.S. Home Forces, on behalf of Lord French, and by Sir Edward Henry, Commissioner of Metropolitan Police.

MIDWIFERY SERVICE IN LONDON.

An investigation into the provision for midwifery service in London is the subject of a report by Dr. Janet Lane-Claypon to the Local Government Board.[2] In 1915, in the County of London, 90,345 births were attended in the homes and between 9,000 and 10,000 in institutions. Any shortage of facilities for in-patient treatment which can be said to exist is attributed to the unequal distribution of institutions, and not to any lack of total accommodation for complicated cases. Of the births occurring in the homes, it is estimated that 38,146 were attended by doctors and 32,461 by independent midwives, and that 19,738 were attended from institutions which carry on out-patient maternity work. About 7,000 of the cases in this last category—a diminishing number—were attended by medical students and the remainder by midwives connected with the institutions. These institutions belong to four classes—namely, those attached to general, to special, and to maternity hospitals, and those (seven in number) which exist for out-patient maternity work only; the standard exacted from the midwives on the staffs is good on the whole, and in some cases very high. About half the midwifery practice of general practitioners in the home is among persons who cannot be described as belonging to the well-to-do class. The fee in these cases is most frequently between one and a half and two guineas, and its value is often given many times over in the services rendered by the practitioner. Attention is drawn to the frequently unsatisfactory nature

[1] H.M. Stationery Office. Price 6d. net.

[2] Reports to the Local Government Board on Public Health and Medical Subjects. (New Series, No. 111.) Report on the Provision of Midwifery Service in the County of London. By Janet E. Lane-Claypon, M.D., D.Sc. London: His Majesty's Stationery Office. 1917. (1s. net.)

of the work of the "handy-women" engaged in the home, and especially to the fact that from an exaggerated idea of their own importance these women often fail to send for the doctor in time. It is said that even apart from such cases, it is almost impossible for a doctor to be certain that he will be able to attend a given confinement, and that the remedy is to ensure the engagement of a certificated midwife for all confinements, whether a doctor is also engaged or not. The number of practising midwives unconnected with institutions was 377 in 1915, of whom 329 were midwives by examination, and 48 were registered by virtue of having been in practice before 1902. The average number of cases attended by each midwife in the year was 86.1. The amount of antenatal work done by midwives is not large, but many competent women could do more if they had time and were paid for it. The provision of medical aid in emergencies at or after confinements is a source of anxiety to many midwives, but the fact that generally this aid is forthcoming so readily is greatly to the credit of the medical profession, especially in view of the precariousness of the fee. The number of cases which a midwife fully at work might be expected to cover in the course of the year is given as 120 (or 130 if the area is fairly compact), and on this basis, if £3 a week be regarded as a reasonable income, the value of her services for each case would be 25s., this sum to include antenatal visiting, full midwifery service, and adequate maternity nursing. Such a fee is beyond the capacity of all except a few of the midwifery patients. The usual fee is from 12s. 6d. to one guinea for first confinements, and less for later ones. The majority of midwives, even with large practices, rarely have an income exceeding £100 a year. Notes on the maternity work of each of the medical schools and institutions providing midwifery service are appended to the report.

THE LINGFIELD EPILEPTIC HOMES AND SCHOOLS.

The twenty-first annual report of the Incorporated National Union for Christian Social Service gives particulars of the epileptic colony at Lingfield, Surrey, for 1916. The 308 epileptic patients in the colony, over half of them being of school age, are accommodated in ten separate homes, one being for children under the age of 8. Three are for girls—two for those under 16 years of age, and one for those above this age who have passed through the school. For boys under 16 years there are three homes, and three homes for adults, who are instructed in market gardening, carpentry, bootmaking, tailoring, and lathe work, etc. The report of Dr. A. Hume Griffith, the medical superintendent, shows that there had been no death for nearly two years, and great improvement in the health of the patients had been brought about by the care and treatment given in the colony, as evidenced by marked diminution in the frequency of fits recorded in a large number of cases. Of 352 pupils subjected to mental tests, 220 are tabulated as improving, and only 28 as deteriorating. The schools are certified by the Board of Education under the Elementary Education (Defective and Epileptic Children) Act, and are visited by its inspectors. A smaller epileptic colony, under the management of the same society, also exists at Starnthwaite, Westmorland.

Correspondence.

THE CO-ORDINATION OF BRITISH MEDICAL POLICY.

SIR,—Dr. Gordon's letter is admirable; the question to be now settled is how to make the ideas contained therein fructify. He says, and says truly: "We must rely on the British Medical Association." And everyone who knows what the Association has accomplished in the past must realize that he is right. But he is also right in saying that the Association has failed in many instances, and this has been due, in part, to inherent faults in its constitution. This especially applies to that aspect of the doctor's life which is chiefly financial. Dr. Gordon calls for a first-rate business secretary and cessation of financial waste, and he hints how these are to be obtained. He also wants a "considerable fighting fund" to be formed. What I want Dr. Gordon to explain is the purposes for which this fighting fund is to be used. If it is to be used to better our financial demands, to prevent degrading conditions being imposed upon us, to support men who resist the arbitrary regulations which may be issued, say, by the Insurance Commissioners, I fail to see the difference between it and a trade union fund except in name.

I am in a dilemma, for, like Dr. Gordon, I intensely dislike the idea of a trade union, but modern conditions must be fought with modern weapons, and yet I should be the last to advocate "physical force" or "peaceful picketing," but there are such weapons as masterly inactivity or refusal to work under certain conditions: as an example, suppose the Insurance Commissioners, or a probable State Medical Commission, were to issue regulations which would be considered degrading by the profession, would not the refusal to work under such conditions compel their withdrawal? Let me be clear. By "refusal to work" I do not mean refusal to see or treat sick people; I do mean refusal to treat or see them except under our own conditions—that is, as our private patients. I am quite sure that the general population would not go without necessary medical attendance; and although the policy I suggest might result in an actual loss of income to the whole profession, yet such loss would be only temporary.

But to return to Dr. Gordon's axiom, "We must rely on the British Medical Association." Will Dr. Gordon consent to the Association being made comprehensive enough to contain within it, or perhaps to run in double harness with, another association which is run on purely "protective" lines? To me this seems to be the only practical policy in the present crisis, and it is because of this that I am a member of such an association as well as of the British Medical Association. Why is it that medical men want to run two or three societies for almost similar objects? Is it not because of our jealousy of one another? Why is it that such societies do not amalgamate and so prevent waste of energy and money? Is it not because of the vested interests of the officials?—I am, etc.,

Plymstock, June 11th. S. NOY SCOTT.

SIR,—It is to be hoped that many more men will awaken to the urgency there is for improving the organization of the profession in view of the vast changes in public medical services that may at any time be upon us.

Dr. Gordon, of Exeter, suggests improvements in the British Medical Association, and a cutting adrift from all taint of trade unionism. I have heard and read much abuse of the British Medical Association, but I have never before heard it accused of undue flirtation with trade unionism. Apart from some minor alterations in the British Medical Association there is no constructive policy outlined in Dr. Gordon's letter, and we are to rely in a final appeal to our personal honour and an enlightened public conscience.

May I be allowed to make suggestions of a more practical nature? The Insurance Act has given us the groundwork of an excellent professional organization. Whereas the British Medical Association, medical trade unions, and other bodies have members scattered about here and there, there are thousands of men who belong to neither the one nor the other, and will never do so. The panel system, on the other hand, gives us 16,000 medical men whose names, addresses, and panel responsibilities are known. Above these, and intimately in touch with them, are popularly elected Panel Committees in every area. But here the organization ends; no Panel Committee knows its neighbours, nor has any idea of what they are doing.

The following points may help to improve matters:

1. The standardization of Panel Committees in dates of meetings, in methods of finance, in presentation of agendas, minutes and reports to panel practitioners.
2. The active co-operation of Panel Committees with the formation of a central committee.
3. The central committee must be popularly elected, and, though small, every Panel Committee must have definite representation on it, one man representing many Panel Committees.
4. After the war there should be at once created an executive or inner committee of whole-time men with a whole-time solicitor at £1,000 a year each. They would give their whole time to our needs, catching new movements at their very start. They would keep Panel Committees conversant with the trend of affairs, and again by "general news" in a quarterly panel magazine they would keep the panel practitioners in any area up to date in panel happenings. They would negotiate with Government departments, but would not be allowed to compromise us or take any action without first obtaining our consent. Being good men with at least ten years' general practice

behind them they would make up their minds what should be done and just ask us "Yes" or "No" before doing it. That is a very different matter to asking us to initiate a course of action ourselves, and allows of speed. Twenty-four hours should be enough to get a referendum of the 16,000 panel practitioners on any important and clear-cut issue such as a wholesale resignation.

5. Finance. The penny per head per insured person is over £40,000 a year—a large amount, but not much as insurance to stop the tuberculosis sixpence, £240,000 a year, or the Treasury grant of £1,200,000 a year, being taken from us.

6. Trade unionism. There are still many men who imagine the whole duty of a trade unionist is "peaceful picketing" or throwing bricks at one another's windows. The Trade Union Acts offer certain immunities to trade unions and their funds, for which labour worked many years to get, and of which we should be fools if we did not take advantage. I would ask those who consider the profession should rely on "our own personal honour and an enlightened public conscience" to carry us through to consider the following fact: Our notification fee was reduced from 2s. 6d. to 1s. as a war economy, thereby saving £23,000 a year; shortly afterwards the organized railway men received their second war bonus of £7,500,000. I think the money talks!

7. The weapon of wholesale resignation. By Clause 1 of the original Act and Clause 3 of the 1917 Regulations we are bound to accept any and all changes the Government may think fit to make in our terms of service. The alternative proscribed by the Government is to resign. The abrupt terminology of the notice forwarding us new regulations (1916) ends with the following: "If you desire your name to be removed from the medical list at the end of the current year, notice in writing to that effect must be given to the (Insurance) Committee by the 19th of November. Failing such notice, you will be deemed, in accordance with Article 17 (2) of the Regulations, to have undertaken service during 1916, on the terms of your agreement as modified in the manner of which the Committee have given notice."

8. Universal adoption of the "Kent scheme," which aims at complete preparation for a resignation of the county *en bloc* and for the conduct of such a campaign. Its chief points are the collection and use of resignations by the Panel Committee, the pledge of practitioners that their resignation will not be sent in if in a hopeless minority in any place, the injunction that men must disregard all other advice during the crisis except such as comes to them through the Panel Committee, the removal of noxious clauses and the inclusion of such new "essential clauses" in the agreement as the strength of the resignation permits, and the circulation of a scheme for carrying on medical practice in the event of a deadlock ensuing, and the resignations really taking effect.

These matters are already under discussion in many quarters; let us form our Central Committee at once, and let our preparation for a wholesale resignation be now made so perfect that we shall get all we want without ever bringing it into force.

I would suggest to the British Medical Association that there was a time when we enjoyed meetings under its auspices devoted to scientific debate and interest. Since the coming of the Insurance Act they have stopped; so much so that in East Kent we have had meetings, medical politics barred, apart from the British Medical Association. There is a large demand for such scientific meetings, and let the British Medical Association look to its laurels or they may find, when they are tired of medico-politics, some one else in the realms of science they have left empty so long.—I am, etc.,

Ashford, June 12th. FRANK COKE, F.R.C.S.

WAR EMERGENCY FUND
OF THE ROYAL MEDICAL BENEVOLENT FUND.

SIR,—The time has come to make a further appeal for the War Emergency Fund.

This Fund was instituted last year to afford assistance to members of our profession who, in consequence of having joined the Army Medical Service, find themselves in temporary difficulties.

Many medical men, when called up, had to leave on very short notice, without time to make adequate provision for the continuance and maintenance of their practices during their absence. As a result they have had to face a severe fall in income even when supplemented by army pay; while many expenses, such as rent, insurance, taxes, family maintenance, and education, could not be reduced. Although in a year or two after their return it may be hoped those affected will recover their position, still in the interval help is, and will be, necessary, and it is to meet these needs that the War Emergency Fund was established.

To be effective the grants must be made on a liberal scale, and the fund from which they are to be drawn must be a large one. The sum obtained last year was about £4,000. This is quite inadequate, as at least £25,000 will be required, if even a small proportion of those requiring assistance is to be helped. From the wealthier members of the medical profession, it is hoped, substantial sums will be received, but every one should feel it a duty which he owes to his less prosperous colleagues to give the most liberal donation he can afford.

At the same time the appeal is not, and ought not to be, restricted to the medical profession. The public, too, may be rightly called upon to bear its share, and to show, by liberal contributions, its appreciation of the special services so freely rendered by the medical profession to the country.

The War Emergency Fund is a special department of the Royal Medical Benevolent Fund. It is kept separate and distinct from the ordinary operations of the general fund, and is under the management of a committee specially appointed for the purpose.

Communications should be addressed to the Honorary Secretary, War Emergency Fund, 11, Chandos Street, Cavendish Square, W.1., to whom cheques should be made payable.—We are, etc.,

SAMUEL WEST,
President.
CHARTERS J. SYMONDS, Colonel A.M.S.,
Honorary Treasurer.
G. NEWTON PITT., Major R.A.M.C.,
London, W.1, June 8th. Honorary Secretary.

Cases of Special Distress caused by the War which the Committee have Helped.

A lieutenant in the R.A.M.C., who had only been in practice a few years, volunteered for service, and was killed in action a few days later. He left a widow, with two children, aged 3½ and 1 year, without means except the War Office pension. The Fund voted £25 for her immediate necessities, and the Officers' Families Fund gave further help.

A captain in the Territorials was called out, and had to leave his practice in the hands of a locum, who proved a failure. There were seven children aged 2 to 14. Financial difficulties arose, and payment of the school fees became impossible. Between the Fund and Guild, and the Officers' Families Fund, the necessary fees were raised, and sorely needed clothing provided.

A captain in the Territorials, who was called out when the army mobilized, and had to leave his practice worth £800 at a day's notice, could not pay the fees for his son's education, who was in his last year at school. The Fund, the Guild, and the Professional Classes War Relief Council together raised the necessary money.

A captain in the Territorials was killed in action, and left a widow, and two children, aged 3 and 4½ years. The Fund investigated the case, and referred it to the Officers' Families Fund, who gave her a grant to meet her immediate necessities. The Fund also obtained work for the widow, a trained nurse, who was thus enabled to earn her own living.

A major, R.A.M.C., Territorial, was called out at the beginning of the war and was abroad for over two years. He was invalided to England and put on home service. His practice was completely lost by his absence. There are three children, one in the navy, one in the army, and one at school. He had to give up his house, as he was in difficulties with rent, taxes, and education. The Fund gave £50, and further help was obtained from other sources.

A captain in the R.A.M.C.(T.), with a wife and six children, found the income derived from his practice, left in charge of a locum, and the balance of his army pay insufficient to meet his expenses. He obtained assistance from the Civil Liabilities Committee and the Officers' Families Fund, and a grant was made from the War Emergency Fund towards the education of the children.

A practitioner, earning £700 to £800, volunteered for service, leaving his practice in the hands of a neighbour, who was not a success. There were two children, aged 7 and 10, and another baby was born shortly after the husband left. The wife contracted pneumonia and nearly died. A resident patient had to leave the house. Rent and other expenses led to a debt of about £80. This the doctor could not meet, and he hurried back from the trenches to save his home from being sold up. The Fund voted £25, the Guild gave £15, the Officers' Families Fund £25, and the Professional Classes War Relief Council offered further help, with the result that he returned to the front with his immediate anxieties relieved.

RESEARCH ON THE ANTISEPTIC PROPERTIES OF "FLAVINE" COMPOUNDS.

SIR,—Under the heading "The Antiseptic 'Flavine' (Acriflavine)," an official statement by the Medical Research Committee appeared in this JOURNAL last week.

As the original publication concerning "flavine" was made from this department, and based on work by several members of the staff (Browning, Gulbransen, Kennaway, and Thornton[1]), the unfortunate impression might be

[1] BRITISH MEDICAL JOURNAL, January 20th, 1917.

created unintentionally in the minds of those reading the Medical Research Committee's statement that we had neglected to acknowledge its share in furthering this work. I would, therefore, add to what it has said that when after the outbreak of the war it seemed to us that further investigation on antiseptics was urgently required, the Medical Research Committee was approached with a view to securing its support for this department of the Middlesex Hospital on the subject, and we met with most cordial interest, the first material outcome being that the Committee provided the emoluments of one part-time worker. As a result of the combined facilities afforded by the hospital and by the Medical Research Committee it was possible to resume work on the lines of that which had been done by myself along with Gilmour[2] in Professor Muir's department at Glasgow University some years ago, and before this country enjoyed the benefit of the operations of a State Medical Research Committee; thus we were able here to develop the investigation with a view to a practical application in the treatment of infected wounds. The introduction of brilliant green as an antiseptic in the treatment of wounds by Leitch[3] appears to have been a valuable practical outcome of attention drawn to this substance by our earlier work, and we have also recommended "flavine" ("acriflavine") as a result of the continuation of this work, the original experimental part of which was carried out here with a sample which had been supplied to us under the auspices of the late Professor Ehrlich in 1912. The Department of Biochemistry and Pharmacology of the Medical Research Committee has been especially helpful by preparing the latter compound, and so affording a considerable quantity for clinical trial of what, up till recently, we believed to be the most valuable member of this group; in this way they supplemented our slender store of somewhat less suitable compounds of the same type (acridine dyes), although the latter, judging by the opinion of Colonel Pilcher, D.S.O. (see Browning, Gulbransen, Kennaway, and Thornton,[1] also James,[4] and the report by D. Ligat,[5]) also proved valuable clinically. The assistance afforded by the Medical Research Committee, as well as by the Royal Society's Scientific Grants Committee towards this work of the Bland-Sutton Institute, was acknowledged in the only publication which we have made.

It is, of course, almost unnecessary to say that neither the staff of the institute nor the hospital has been concerned in any way with the production and supply of "flavine." The Medical Research Committee's Department of Biochemistry and Pharmacology has since then continued to give us valuable aid, especially by providing an experimental supply of "proflavine" (the basic constituent of which had been examined by Browning and Gilmour, loc. cit.). We have had no opportunity of acknowledging the latter, as we have as yet made no publication on the investigation of its properties. However, the tribute to the Committee's aid paid by Sir John Bland-Sutton in his speech at a recent quarterly meeting of the Board of Governors of the Middlesex Hospital and widely published in the daily press prior to the appearance of the Medical Research Committee's official communication, would appear to have anticipated the latter in a generous and sympathetic correction of any erroneous impression which might have existed anywhere in the public mind.—I am, etc.,

C. H. BROWNING.

Bland-Sutton Institute of Pathology,
Middlesex Hospital, June 11th.

*** The following is communicated by the Medical Research Committee: "By the courtesy of Dr. Browning the Committee have had an opportunity of seeing the foregoing statement. They would entirely confirm the accuracy of the account Dr. Browning gives. Their communication to the lay press last week was made to correct so far as possible the results of recent statements made in the lay press which were based upon misapprehension of the present situation in regard to the properties and the supply of acriflavine, and must have been an equal source of embarrassment to all concerned. They would greatly regret that their communication should be read in any other sense."

[2] *Journ. of Path. and Bact.*, vol. xviii. 1913, p. 144.
[3] BRITISH MEDICAL JOURNAL, February 12th, 1916.
[4] *R.A.M.C. Journ.*, March 1917.
[5] BRITISH MEDICAL JOURNAL, January 20th, 1917.

TYPHUS FEVER AND THE SO-CALLED WEIL-FELIX REACTION.

SIR,—In the BRITISH MEDICAL JOURNAL of May 19th, 1917, p. 649, the following note is given:

> The German authorities have arranged for the systematic testing at the Robert Koch Institute of blood taken from patients suspected of typhus fever. The Weil-Felix reaction is employed, and whenever the reaction is negative but the clinical symptoms remain suspicious, a second sample is examined.

I read this with great interest, since it shows that investigations carried out by me at Belfast some ten years ago are now being confirmed on an extensive scale. The results of my investigations were published in the *Journal of Hygiene*. The names of my papers are the "Etiology of typhus fever,"[1] and "On heterologous agglutinins, more particularly those present in the blood serum of cerebro-spinal fever and typhus fever cases."[2] In these publications I showed that in typhus fever the blood serum often agglutinates intestinal bacilli—for example, *B. coli*, *B. typhosus*, and especially a coliform bacillus isolated from the urine of certain cases. I pointed out in the paper dealing with the etiology of typhus fever that the presence of these agglutinins did not necessarily imply that the bacillus in question was of etiological importance. I rather inclined to the view that we were dealing with an interesting instance of secondary infection. I showed that in the blood of healthy controls the agglutinins were present in very much smaller amount. At a later date French observers in Northern Africa showed that in a certain number of instances the blood serum of cases of typhus fever there agglutinated the *Micrococcus melitensis*.

The whole question of heterologous agglutinins is fully discussed in my paper in the *Journal of Hygiene*, and before the reaction is credited to Weil-Felix, I think it but fair that my work on the subject should be considered. I am sorry that I have no opportunity here to consult all the literature on the subject, but the reference given in the *Bulletin de l'Institut Pasteur*, xv, No. 8, April 30th, 1917, p. 243, indicates that Dietrich[3] had found the "Weil-Felixschen Reaktion" of diagnostic value, and that it was evidently an example of paragglutination. I learn from this paper the following facts: (1) Weil and Felix isolated from the urine of two typhus fever patients a bacillus termed by them X 19, which was agglutinated in a specific fashion by the serum of typhus fever cases. (2) Dietrich showed that this bacillus belonged to the *Proteus vulgaris* class. (3) In 90 per cent. of 500 cases of typhus fever in the German army agglutination of the bacillus was present in a 1 in 100 or higher dilution of the patient's serum, whereas it was absent, or only present to a feeble extent, in an equal number of non-typhus controls.

It would seem, therefore, that this work of Weil, Felix, and Dietrich is a rediscovery of what was pointed out by me in the *Journal of Hygiene* many years ago. I also pointed out that in the acute stage of the disease the eosinophile cells disappear from the circulation, but that in convalescence there may be a transient eosinophilia; this fact has also been recently rediscovered by the Germans.

I may remark at this point that typhus fever is a disease in which cultures from the urine, besides showing the presence of coliform bacilli, often yield enterococci. I am of opinion that research may yet show that a certain degree of kinship exists between the so-called trench fever and typhus fever. They would seem to have the following etiological points in common: (1) Virus unknown or uncertain; (2) virus conveyed by lice in the case of typhus, possibly by lice in trench fever[4]; (3) the frequent occurrence of enterococci in the urine of trench fever cases (Houston and McCloy). In the urine of typhus fever cases Dr. Georgina Darling and I at Belfast have frequently found enterococci. Of course, typhus fever in adults is a much more serious condition than trench fever, but in children typhus fever is so mild as to be comparable to trench fever.

In conclusion, it would seem that those who hold that it is possible by the agglutination test to diagnose the infective agent, even in the case of inoculated subjects, should give more attention to the question of heterologous or

[1] *Journal of Hygiene*, 1910, vol. x, p. 155.
[2] Ibid., 1909, vol. ix, p. 306.
[3] *Deut. med. Woch.*, December 21st, 1916, pp. 1570-73.
[4] Davies and Weldon, *Lancet*, vol. excii, p. 183, 1917.

paragglutination. The recent paper by H. Conradi and R. Beiling, "Ueber Fehlerquellen der Gruber-Widalschen Reaktion," is most instructive in showing that in an inoculated subject the titre of agglutinins for the injected bacillus may be increased not only by an infection with it, but also by an attack of various other diseases.—I am, etc.,

W. JAMES WILSON, M.D., D.Sc.,
Captain R.A.M.C.(T.F.).

No. 54 (London) General Hospital,
B.E.F., May 25th.

ANAESTHESIA BY WARMED ETHER.

SIR,—To whom should the credit be given for the invention of "open ether" and of "warmed ether"? Hitherto these discoveries have been assumed to have originated in America. It has, however, been recently pointed out to me by Mr. E. Mayer, of Messrs. Mayer and Meltzer, that the late Mr. Lawson Tait published in 1883 an account of "an apparatus for administering ether vapour at blood-heat."[1] Lawson Tait was an enthusiastic advocate of ether, which was given (by the sister in charge or by a nurse) after the simple fashion introduced by Sir James Simpson for the administration of chloroform—that is, by dropping it on the outside of a single fold of a towel. Certain directions were given by Lawson Tait for successful anaesthesia: thus the towel must be not too thin, but of such a texture as to ensure the passage of air freely through it; the ether must be dropped continuously, not splashed on, in order to obtain a continuous volume of ether vapour, and the towel must be puffed out around the face at a distance of an inch, or an inch and a half, so as to "enclose a body of vapour." Lawson Tait held that the only risk about the administration of ether was the occurrence of bronchitis in old people. Hence he devised his apparatus for giving in these cases warmed ether vapour at a temperature of 33° C. A glass boiler containing three drachms of ether was suspended in a hot-water tank, beneath which was placed a spirit lamp. From the boiler an exit tube passed to a Junker's mouthpiece.

It is fairly obvious that these are the first published accounts of "open ether" and of "warmed ether." It is curious that they should have been so long neglected, for Lawson Tait's writings must have been widely read. Was this neglect due to prejudice arising from the unskilful administration of ether and the greater convenience to the surgeon of chloroform, or was it due to the influence of Clover, which led strongly in the direction of closed methods?. Perhaps the use of closed methods condemned ether entirely for abdominal operations in the eyes of some surgeons. It seems a pity that Lawson Tait's methods were not more practised.

Dr. Beresford Kingsford's letter in your issue of June 2nd (p. 748) raises a point of considerable importance. He objects to rebreathing during ether anaesthesia. On what grounds? The observations of Dr. Pembrey and myself on the composition of the air under masks during ether anaesthesia[2] show that in open methods (which include warm vapour anaesthesia) there is some rebreathing. This is looked upon as beneficial to the patient, owing to the stimulating effect of carbon dioxide upon the respiratory centre. We found that carbon dioxide is present in adequate but not excessive amount, and the oxygen supply is ample. There is no danger of acapnia. It is in the closed methods that the rebreathing is excessive; the amount of carbon dioxide is too high, and the oxygen may be decreased to a point which is dangerously low.

It will, I am sure, much interest Dr. Kingsford to know that in Kappeler's *Deutsche Chirurgie*, 20, 1880, s. 185, appears an illustration of Hawksley's inhalation ether apparatus of the "draw-over" type. It is almost exactly similar to that described by Dr. Kingsford. "There is nothing new under the sun."—I am, etc.,

London, W., June 2nd. FRANCIS E. SHIPWAY.

FRAGILITAS OSSIUM, BLUE SCLEROTICS, AND OTOSCLEROSIS.

SIR,—In a note on fragilitas ossium (BRITISH MEDICAL JOURNAL, June 2nd, p. 739) it is stated that "the earliest record of association of the blue sclerotic with fragility of the bones was made by Eddowes in 1900." This is a mistake. In 1896 I contributed a short article to the BRITISH MEDICAL JOURNAL, entitled, "Hereditary tendency to fracture." In it I described the history of three or four generations of a single family in which an extraordinary number of fractures occurred, many of them under my own care. I added: "The only other symptom common to these cases was a blue sclerotic," which I had never seen under other circumstances. This was four years before Dr. Eddowes's record.—I am, etc.,

London, N.W., June 4th. JOHN SPURWAY, M.B.

[1] *Diseases of the Ovaries.* Fourth edition, p. 266.
[2] *Proc. Roy. Soc. Med.*, 1916, vol. x, No. 2, p. 7.

Universities and Colleges.

UNIVERSITY OF LONDON.

A MEETING of the Senate was held on May 23rd.

Examinations for the M.B., B.S. Degree.—It was resolved to exempt candidates for the M.B., B.S. degree from attendance at certain systematic lectures.

Examiners.—The following were appointed staff examiners in the subjects indicated for medical degrees for 1917-18:—*Anatomy:* Professor R. W. Reid. *Bacteriology:* Professor R. T. Hewlett. *Chemistry:* P. Haas, D.Sc., and Professor J. M. Thomson. *Forensic Medicine and Hygiene:* Dr. F. J. Smith and Professor Matthew Hay. *General Biology:* J. S. Thomson, M.Sc., and J. T. Cunningham, M.A. *Medicine:* Professor A. J. Hall and Dr. James Galloway, C.B. (internal). *Mental Diseases and Psychology:* Dr. R. H. Cole and Dr. W. H. B. Stoddart. *Obstetric Medicine:* Professor W. C. Swayne and Dr. G. F. Blacker. *Pathology:* Professor F. W. Andrewes and Professor J. Martin Beattie. *Pharmacology:* Professor R. B. Wild. *Physics:* W. Makower, D.Sc., and F. L. Hopwood, M.Sc. *Physiology:* Professor D. Noël Paton. *State Medicine:* Dr. R. K. Brown and Dr. W. G. Savage. *Surgery:* Mr. William Turner, M.S., and Dr. V. Warren Low. *Tropical Medicine:* Professor F. M. Sandwith, C.M.G., and Dr. C. W. Daniels.

Personnel of Senate.—Professor G. A. Buckmaster has been appointed the representative on the Senate of the Faculty of Science for the remainder of the period 1915-19 in the place of Professor A. D. Waller, resigned.

Annual Report of the Vice-Chancellor.—The Vice-Chancellor, Sir Alfred Pearce Gould, in his report on the work of the University during the past year, stated that the number of members of the University who were known to be serving, or had served, with the forces, was estimated at about 21,000. The war had increasingly depleted the teaching and administrative staffs, but the component colleges and individual workers had managed to close up the gaps by mutual assistance, while economies undreamt of in normal times had been effected. The University through its research departments and laboratories had come to the assistance of the Government departments in fulfilling the manifold requirements of the war. The report also referred to the admirable response to the demands of the War Office made by teachers and qualified students in the medical schools of the hospitals affiliated to the University.

The following candidates have been approved at the examinations indicated:

THIRD M.B., B.S.—*†J. I. Keen, *†J. H. Thomas, C. V. Boland, C. C. Chesterman, Hetty E. Claremont, Raghunath Ganesh Dani, P. O. Ellison, T. S. Evans, J. W. Heekes, J. J. Jhirad, F. A. Knott, E. E. Lightwood, J. E. G. McGibbon, G. A. S. Madgwick, F. Molina, V. J. E. C. del S. Perez y Marzan, Pinthu Sai, B. Sampson, Raghunath Dadoba Shirvalkar, P. Smith, D. J. Thomas, Lotty Weihermann.

B.S. EXAMINATION.—S. Forsdyke.

* Honours. † Distinguished in Surgery.

The following candidates have passed in one of the two groups of subjects:

Group I: Hannah K. Alton, Elizabeth L. Ashby, Margaret S. G. Bott, Dorothy T. Daintree, Alice M. L. Greaves, Rosalie Jobson, W. A. E. Karunaratne, S. Muttiah, M. Schwartz, Ellen Sylk.
Group II: T. A. Davies, Susan A. Finch, H. M. Holt, H. C. Jennings, C. V. Pink.

UNIVERSITY OF BIRMINGHAM.

DR. J. W. RUSSELL, F.R.C.P., has been elected joint Professor of Medicine to succeed Professor Saundby, whose resignation takes effect on September 30th. The council has resolved to recommend the court of governors at its next meeting to confer the title of Emeritus Professor upon Professor Saundby in recognition of his conspicuous services to the University and his eminence in the general field of medicine.

The vice-chancellor, Professor Gilbert Barling, F.R.C.S., has been appointed the representative of the University on the General Council of Medical Education and Registration for five years from October 1st.

THE COUNCIL OF THE ROYAL COLLEGE OF SURGEONS.

MR. HARRISON CRIPPS, of St. Bartholomew's Hospital, has decided to offer himself for re-election as a member of the Council, and Mr. Vincent Warren Low, C.B., of St. Mary's Hospital, will also seek re-election. There are five new candidates: Mr. Henry Betham Robinson, Member since 1883, Fellow 1887, of St. Thomas's Hospital; Mr. Francis James

Steward, Member 1895, Fellow 1898, of Guy's Hospital; Mr. James Sherren, Member 1899, Fellow 1900, London Hospital; Mr. Harold Barr Grimsdale, Member 1894, Fellow 1894, of St. George's Hospital. Mr. Grimsdale, M.B., B.C.Cantab., is ophthalmic surgeon to a hospital not at present represented on the Council, nor are there any eye surgeons nor representatives of Cambridge University at present among the Councillors. The fifth candidate is Fleet Surgeon Percy William Bassett-Smith, C.B., R.N., Member 1883 and Fellow by election 1916, professor of clinical pathology, and lecturer on tropical medicine, Royal Naval College, Greenwich, who offers himself for election as a representative of the Services.

The Services.

TERRITORIAL FORCE.

TERRITORIAL DECORATION.

THE King has conferred the Territorial Decoration upon the following officers:

Army Medical Service: Colonels C. T. Green, J. R. I. Raywood.
Royal Army Medical Corps: Lieut.-Colonel W. G. Richardson; Majors (temporary Lieut.-Colonels) G. A. Troup, A. W. Anderson; Majors A. Butler, A. C. Hartley, R. B. Sidebottom (attached Cheshire Regiment), R. Brodie (attached Seaforth Highlanders), P. Paget (attached East Kent Regiment); Quartermaster and Honorary Major T. Spibey; Quartermaster and Honorary Captain C. W. Hearn.

Obituary.

JOHN MITFORD ATKINSON, M.B.LOND.,

FORMERLY OF HONG KONG.

THE death of John Mitford Atkinson at the age of 60 removes from our ranks one who did yeoman service during twenty-five years in the colony of Hong Kong. He was the son of the Rev. S. Atkinson, M.A., was educated at Taunton, matriculated at the London University, and entered the London Hospital. He obtained honours in Botany at the Preliminary Scientific Examination and the London Hospital prize for Zoology in 1876. He took the diplomas of M.R.C.S.Eng. and L.S.A. in 1878, graduated M.B.Lond. in 1881, and in 1894, when home on leave, he obtained the D.P.H.Camb.

After acting as assistant medical officer at Kensington Infirmary he, in 1887, entered the Colonial Service and was made superintendent of the Civil Hospital, Hong Kong, where he found much scope for administrative changes in the hospital, and though he encountered local opposition he was able, in the end, to substitute a European staff of nurses trained in British hospitals for those who were formerly employed, and the Civil Hospital rose to the front rank. Here it was that many of the disabled Russian sailors of the cruiser *Varyag*, after their fight with the Japanese cruiser *Chemulpo*, received at his hands that skill and care which induced the Czar to present Dr. Atkinson with a gold cigarette case mounted with the Imperial arms in diamonds, as a slight appreciation of his services.

Plague was rampant in the colony, and Atkinson set to work to abate the scourge, and, as a member of the Executive and Legislative Council of the island from 1903 to 1912, his influence was felt. He contributed many articles on plague, malarial fever, and mosquitos to the *Lancet* and BRITISH MEDICAL JOURNAL from 1901 to 1913, and in June, 1894, he read before a meeting of the Hong Kong and China Branch a report, afterwards published in the BRITISH MEDICAL JOURNAL, of a remarkable case of compound depressed fracture of the frontal bone, with wounds of the urethra and scrotum, which ended in recovery. In 1897 he became P.C.M.O. for the colony, but continued to carry on his duties as head of the Civil Hospital.

In 1912 he retired from the Colonial Service, settled in London, and for a time practised as a consultant in tropical diseases. He received a commission as major in the R.A.M.C. on July 26th, 1915, and was appointed head of the Richmond Military Hospital, converting the old and interesting workhouse and infirmary there into an up-to-date war hospital. In addition, all through the winter months he devoted his evenings to ambulance and first-aid work. But the long years of hard work and hard play in the climate of Hong Kong had told their tale, and the strain of the hospital administration taxed his strength; finally, under the advice of medical friends, he resigned his commission. For a little while he seemed to improve, but on May 23rd his end came quite suddenly, after one of the many anginal attacks from which he had suffered.

He was fond of cricket and lawn tennis, was the owner of a few ponies when in Hong Kong, and was a good runner, having run for the London Hospital in the inter-hospital sports. He loved to do good by stealth, and many a one would be able to testify how Atkinson had helped them through monetary and other difficulties. He married on August 3rd, 1898, the eldest daughter of the late Mr. James Eastmond, of Puddyngton, Devon, and leaves his widow and two sons, aged 17 and 16 years, to mourn his loss.

DR. JOHN JAMES NASON, of Stratford-upon-Avon, who died recently at an advanced age, was a member of an old and well-known Warwickshire family. He received his medical education at Guy's Hospital, took the diplomas of M.R.C.S.Eng. and L.S.A. in 1856, and graduated M.B.Lond. in 1858, winning an exhibition and gold medal. He settled at Stratford-upon-Avon about sixty years ago and acquired a large practice. He took a keen interest in the old infirmary, was a member of the medical staff, and greatly assisted the movement for the erection of a building more appropriate to the important work performed. Changes and additions in the building have been made from time to time to keep it up to date. On the occasion of his retirement from the active medical staff in 1880 he was appointed honorary consultant and was presented with his portrait in oils and a service of plate, together with a suitable address. The portrait now hangs in the board room of the hospital. Dr. Nason also took great interest in civic affairs; he became a member of the borough council in 1867 and subsequently held the offices of councillor, alderman, and chief magistrate. On the termination of the latter office he was presented by his fellow members with a handsome silver cup as a mark of esteem. He was a regular attendant at Holy Trinity Church, of which he was a warden from 1884 to 1914, when he resigned in consequence of advancing years, and was appointed honorary churchwarden. He took great interest in the work of the British Medical Association and was president of the Birmingham and Midland Counties Branch in 1884–5.

DR. JAMES ALBERT WETHERELL died recently at his residence in Hull after a short illness. He received his medical education at the University of Edinburgh, where he graduated M.B., C.M. in 1886 and M.D. in 1890. He took the diploma of L.R.C.P.I. in 1885. He had served as assistant medical officer to the Barnsley Union Infirmary, and later as medical officer and Government Resident at East Kimberley, West Australia. Later he settled in practice at Hull, and was a member of the East York Division of the British Medical Association. His wife died about four months ago, and her death appeared to have impaired his health.

DR. JOHN SIDNEY GRAY, who died at Winnipeg on February 11th, had won by his zeal, ability, and idealism the affection and esteem of his colleagues and the devotion of his patients. He occupied the Chair of Gynaecology in the Manitoba Medical College for many years and, since the year 1886, had been the Registrar of the Manitoba Medical Council. He was also representative of the Medical College on the University Board of Studies, and in 1912, upon the formation of the Medical Council of Canada, was unanimously chosen to represent the Manitoba Medical Board on the Dominion Council. He was born near Heckston, in the province of Ontario, on January 26th, 1850, and obtained his medical degree from McGill University in 1876. He practised for a few years in Winnipeg and then went to Europe to study gynaecology, taking a post-graduate course under Lawson Tait. He leaves a widow, one son, and two daughters.

DR. EPHRAIM CUTTER, of New York, died on April 25th, in his 85th year. He was one of the early American laryngologists, and invented many instruments. He graduated in arts at Yale in 1852, and in medicine at Harvard in 1856. He settled in New York in 1881.

Medical News.

A DISCUSSION on meat inspection problems will take place at a meeting of the Royal Sanitary Institute at the Town Hall, Weston-super-Mare, on Saturday, June 30th.

WE are asked to state that the office of the Assistant Director of Medical Service, Canadians, London Area, has been removed to 13, Berners Street, W.1 (Telephone: Museum 3250).

THE London Insurance Committee has appointed a sub-committee to consider the policy of continuing the office of medical adviser for sanatorium benefit, rendered vacant by the death of Dr. J. E. Squire. Dr. George Johnston has been appointed temporarily to attend on three days a week.

THE Chancellor of the Exchequer has informed Captain Rowland Fothergill that officers in uniform and nurses in uniform in attendance on officers are not excluded from the exemption from entertainments tax contained in Section 3 (2) of the Finance Bill. The concession does not extend to nurses when not in attendance on sick or wounded soldiers or sailors.

WE learn that the American Council of Defence—a body organized for the purpose of mobilizing the industries of the country and to supply the needs of the army and navy—has appointed a pharmaceutical and chemical section, and has nominated Mr. Frank G. Ryan, president of Messrs. Parke, Davis and Co., who has enlisted in the army, to be its secretary.

PROFESSOR WARTHIN is giving a course of lectures during the present summer session at the University of Michigan (Ann Arbor, Vermont) on the pathology of camp, trench, and hospital infections, and of trauma, on repair, and on munition workers' diseases. He would be glad to have duplicate slides for the purposes of his demonstrations. So far as we are aware no such course has been given at a university in this country, and its institution is evidence of the thoroughness with which our colleagues in the United States are going into this war.

The child welfare institution, known as the National Children's Home and Orphanage, has published, under the title, *A Sanctuary for Little Pilgrims*, an account of the work of its branch, the Children's Sanatorium at Harpenden. Dr. T. N. Kelynack, the medical adviser and visiting physician, contributes a note on the aim and scope of the sanatorium, which is devoted to the care, education, and treatment of tuberculous and tuberculously disposed children, opened seven years ago by Sir Thomas Barlow. The pamphlet is illustrated with plans and reproductions of photographs, which give a good idea of the sanatorium and its open-air school.

OWING to the urgent need for further accommodation for war staff in the immediate neighbourhood of the War Office and Admiralty, the offices of the Board of Education are to be removed to the Victoria and Albert Museum at the request of the Prime Minister. It will not be at all easy to carry on the work of the Board, especially during the period of transition, and the president relies on all concerned to co-operate with him in order that the administration of the system of public education shall not suffer in efficiency. Although the administrative offices will be at South Kensington, rooms in Whitehall will be retained for the use of the president, parliamentary secretary, and permanent secretary of the Board, and for conferences, deputations, and interviews. The precise date on which the new quarters will be taken up will be announced later; in the meantime, correspondence should continue to be addressed to Whitehall in the usual way.

A NEW publication devoted to the surgery of the organs of movement has made its appearance under the editorship of Dr. V. Putti, professor of orthopaedics in the University of Bologna and director of the Orthopaedic Institute there. It bears the title *La Chirurgia degli Organi di Movimento*, and will be published in fasciculi, six of which will form a volume of 600 pages. The subscription price for foreign countries is 35 liras. It is published by L. Cappelli, Bologna, and Messrs. Williams and Norgate, 14, Henrietta Street, London, W.C.2, are, we understand, the English agents. The first fasciculus opens with a paper by the editor on the surgical mobilization of ankylosis of the knee, and among the other contributions is one by Dr. Delitala on traumatic lesions of the bones of the foot, and another by Dr. Serra on transplantation of bone. In the matter of printing of text and illustrations the new publication is got up in a manner to excite the envy of the editor of a weekly medical publication in this country.

Letters, Notes, and Answers.

THE telegraphic addresses of the BRITISH MEDICAL ASSOCIATION and JOURNAL are: (1) EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand London*; telephone, 2631, Gerrard. (2) FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand London*; telephone, 2630, Gerrard. (3) MEDICAL SECRETARY, *Medisecra, Westrand London*; telephone, 2634, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin.

The address of the Central Medical War Committee for England and Wales is 429, Strand, London, W.C.2; that of the Reference Committee of the Royal Colleges in London is the Examination Hall, 8, Queen Square, Bloomsbury, W.C.1; and that of the Scottish Medical Service Emergency Committee is Royal College of Physicians, Edinburgh.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

ANSWERS.

MESSRS. WEISS AND SON (287, Oxford Street) state that they make a truss corresponding to that as to which "R." inquired in the JOURNAL of June 9th.

LETTERS, NOTES, ETC.

ADVANTAGES OF BIEBRICH SCARLET AS A PLASMA STAIN.

DR. A. KNYVETT GORDON (Medical Superintendent, Virol Research Laboratories, London, W.C. 1) writes: In routine histological work it is customary and advantageous to use a "contrast" stain after the nuclei of the cells have been defined by haematoxylin or (in the case of chronic or sublimate hardened material) by methylene blue. For this purpose eosin is commonly employed, but it has two disadvantages: (1) It not infrequently extracts the colour from the previously stained nuclei; and (2) it colours everything else with the same intensity. Benzopurpurin is free from these drawbacks but it is useless in weak solution, and in adequate concentration is apt to stain very unevenly, and to deposit gelatinous flakes in portions of the section. Picrorubin (Van Gieson's stain), picro-erythrosin and similar preparations have the grave disadvantage of discharging the colour almost completely from the nuclei after the preparation has been mounted for a short period.

Biebrich scarlet is soluble in water freely and is best used in 1 per cent. solution. It never overstains and does not discharge the colour from the nuclei. Most sections are stained sufficiently in two to five minutes. It does not wash out in alcohol, clove oil, cedar-wood oil, or xylol. Its chief advantage, however, is the fact that it stains different tissues with varying degrees of shade and tint. Muscle, for instance, is stained a yellowish-brown, and the protoplasm of young epithelial cells a bluish-pink, while the older keratinized cells are bright scarlet. In an epithelioma, for instance, the degree of pressure to which the epithelial cells have been subjected, which is a valuable guide to the rate of growth of the tumour, is well differentiated. Used after methylene-blue for tissues that have been fixed in Flemming's or Zenker's fluid it does not discharge the nuclear stain. The staining is of marked permanency and the preparation is now obtainable from British Dyes, Ltd., Huddersfield.

"ANTI-TENSION SPRING" FOR STRAPPING.

DR. H. ELLIOT-BLAKE, of Beer, Devon, has devised a means of preventing undue pressure on a tender part by strapping a knee or other joint. A layer of wool or lint is wrapped round a small ruler, or other similar object, in such a way that it can easily be withdrawn, leaving the sheath behind. The strapping is applied to the affected part over the ruler and sheath, and the ruler withdrawn. If this appliance, which Dr. Elliot-Blake calls an anti-tension spring, be placed over an artery, under a joint, or over a tender area, there is elastic recoil. The circulation is not interfered with. When used at the knee the ruler and scabbard are laid along the middle of the popliteal space or over the tender spot. The advantages he claims are: (1) Relief of local unnecessary constringency; (2) a generally improved pressure; (3) arterial and return circulation promoted; (4) anxiety about too tight strapping avoided; (5) the safety pressure gives the *tension spring*.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

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Seven lines and under	0	5	0
Each additional line	0	0	8
A whole column	3	10	0
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An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Wednesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.